From the Mouths Of Babes

By Melissa Boey

Special to Computerworld

Did you know that a lady keypunch operator for computers has to make real sure her holes are in the right spots, otherwise the computerman will not get it?

Or that the very first modern computer was built in the Dark Ages of 1930, in either the A.D. or M.D. times of history?

I didn't know these facts either – until I ran across these gems in my former elementary school children's reports. They were delivered to me in all earnestness when the children were doing some elementary research on computers.

During my 10 years teaching kids in the fifth and sixth grades in New York City, I've had ample opportunity to record some of my flock's classroom boners.

For those engaged in the computer industry, I offer them to you, knowing you'll have your fancy tickled:

"If you like to fool around with figures alot become a design engineer. My Uncle Henry is one, and he fools around alot with figures."

"A computer operator puts information into a computer in two ways – by punched cards and by tapes. In the end it comes out like six of one and one for all."

"The programmer can't even make one teeney-weeney mistake, when he feeds the computer. If he does, it can spell a sure Miss Fortune."

"If it wasn't for the ticnickle artist and the ticnickle writer who tell you and show you how to work it, you would really be in a pickle."

Quite often in the classroom, children have a way of allowing the teacher to think that they have absorbed new learning. But, alas, the teacher learns

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Jury Out in Landmark User-IBM Unbundling Suit

By Molly Upton

Of the CW Staff

PROVIDENCE, R.I. – One of the first user suits against IBM to complete a trial is now in the hands of the jury.

After 55 days of testimony here, the jury will now have to decide whether IBM fraudulently misled Catamore Enterprises, Inc. – and, by implication, other users – by unbundling in 1969.

The case went to the jury last week even after Judge Raymond J. Pettine had offered his services to effect a negotiated settlement and after he had urged both parties to consider such an action.

Pettine noted that the Pandora's box of possible future lawsuits against IBM on similar grounds by dissatisfied customers "is going to be opened up whether they [IBM] win or lose this case; whether they settle or they don't settle this case.

"I don't think that any other clients are going to refrain because they say 'so-and-so lost the case,' " Pettine said.

Pettine told the attorneys "if there ever was a case which, in my opinion, the parties should seriously negotiate, I think this is the case where they ought to do it . . .but you should have a bottom-line figure of around $1.5 million."

He admitted the stakes are high on both sides. On the one hand, the jury could find in favor of Catamore for anywhere from $12 million to $30 million, he suggested, but "whether it would stick on appeal I don't know . . . "

On the other hand, Catamore could wind up paying IBM $68,453.23 plus costs and interest. That is how much IBM claims Catamore owes it in unpaid rent.

During a long day of final arguments, the attorneys took advantage of no interruptions from the bench and their freedom to present, in their words, the evidence that had been elicited in the courtroom during the previous three months.

Catamore's lead attorney, Thomas K. Christo, came close to telling the jury that, if it didn't find in favor of Catamore, justice wouldn't be done because IBM and other similarly large corporations would still be at liberty to be outside the law.

Noting "this is the beginning of a Watergate for a large American corporation, which will alert every chairman of the board [he] cannot step outside the law," Christo told the jury the small businessman does live by ethics, by rules.

"The question we have been asking is why the powerful and elite should be able to live outside the law," he said.

His thesis, he contended, was not that bigness is bad, but "large corporations should not be allowed to make revenue

(Continued on Page 4)

Vendors Claim IBM Bias in Arkansas Bid

By Patrick Ward

Of the CW Staff

LITTLE ROCK, Ark. – Controversy is surrounding the equipment procurement for this state's Information Systems Plan, in which IBM is the sole remaining bidder.

Four other mainframers have dropped out of contention for the contract, charging favoritism to IBM.

The state's central DP shop reserved a 370/158 well before the requests for proposals (RFP) went out on the Information Systems Plan, they said.

Two IBM consultants, working at no charge to the state, helped Arkansas Information Systems Executive Committee (Isec) officials with information systems methodology for an eight-month stretch before the RFP went out, the vendors noted.

The RFP was weighted toward IBM, and the benchmark made use of programs already running on the state's IBM machines, the vendors added.

The Information Systems Plan calls for updating many current state systems into data base technology and adding new systems. Univac, for one, complained of a lack of time to prepare a representative benchmark.

"In my opinion, 108 days to design and implement four data base systems [in a benchmark] is unreasonable," Don Ellisor, Univac's local representative said. Univac had been the only vendor other than IBM to actually bid on the contract, but decided not to spend an estimated $700,000 needed for it to run the benchmark.

The 1110 multiprocessor system Univac had bid would cost about $125,000/mo, or $60,000/mo less than IBM's proposal, Ellisor said. Univac's purchase price was $6.9 million compared with $8.3 million for IBM, he said. However, an Isec official said the IBM and Univac proposals were actually quite close.

"We had indications from the selection committee that, even if we were successful, we wouldn't get the business," Ellisor said.

Sentiments Echoed

Dr. Morris Smith, a former member of the Isec selection committee, echoed those sentiments. The selection group "was pretty much loaded with people who were already working with IBM equipment and were biased in that direction," he said.

"They have IBM equipment now and

(Continued on Page 8)

Possible Vote-Tabulation Fraud Charged by Defeated Candidate

By Nancy French

Of the CW Staff

EL PASO, Texas – A defeated mayoral candidate is claiming possible fraud in the computer tabulation of votes cast in this city's April 15 mayoral election and will ask for a recount of the 60,000 ballots.

The claim will be presented in federal court here by Woodrow W. Bean, defeated in his bid for the mayor's job by 3,000 votes in an election conducted with polling equipment and software from Computer Election Systems (CES) of Berkeley, Calif.

Bean's claim is based on the findings of Jerry Schneider, a computer security specialist with Jerry Schneider and Co., Inc., a Los Angeles-based firm specializing in computer fraud investigation and consulting.

The claim is contained in an affidavit prepared for a hearing to discuss an injunction that would require the city of El Paso to retain the actual ballots used in the election. At the same time, Bean will ask for a recount.

In the affidavit, Bean contended that "an identical sequence of integers was observed in eight precincts – a situation that could occur only once in 10,000 cases."

In addition, results did not in any way resemble voting patterns established over the past 10 years, he said.

The evidence was generated from a statistical analysis of returns performed by an "expert" statistician hired by Schneider's firm.

Schneider said the returns show "a high probability that an error, omission or technical defalcation occurred in the tabulation of votes in the election . . . and that this could be the first clear case of

(Continued on Page 4)

IBM Satellite Plan Expected in 60 Days

By Molly Upton

Of the CW Staff

WASHINGTON, D.C. – IBM plans to announce within 60 days how it intends to gain entrance into the domestic satellite business.

A letter to the Federal Communications Commission (FCC) on behalf of the joint petitioners – IBM, Comsat, Comsat General and CML Satellite Corp. – indicated they have elected to proceed under the "balanced CML" option outlined by the commission in its Feb. 6 order.

In the letter, the petitioners said Comsat General and IBM have begun holding preliminary discussions with an additional partner or partners that will hold not less than a 10% ownership interest in CML.

IBM would not reveal the identity of the prospective partner or partners. "We're not going to discuss publicly who

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Info/Expo Sets 70 Sessions Next Week

ATLANTA – Seventy seminar sessions keyed to the theme of "Managing for Success" will be presented at Info/Expo 75, the Data Processing Management Association's (DPMA) conference to be held here June 29 to July 2.

The conference will feature Dr. Herbert R.J. Grosch, editorial director of *Computerworld*, as keynote speaker and George Glaser, president of the American Federation of Information Processing Societies, as the opening luncheon speaker.

The Tuesday luncheon address will be given by Charles P. Lecht, president of Advanced Computer Techniques, Inc., on "What Computer Systems Are Doing to Corporations."

Seminars will be divided into five tracks, with 20 sessions on professional management development, 10 on personal growth, 10 on technical subjects and 10 special or repeat sessions. Each will last 1-1/2 hours.

Also included will be 20 product/service orientation sessions, each lasting 40 minutes, in which exhibitors will present concurrent sessions related to their specific products or services.

The sessions on professional management will cover structured programming, DP management, data entry systems, computer graphics, data security, distributive data processing and computer output microfilm.

The second track will include sessions on the cost of DP services, computer auditing, measuring the costs of computer projects, hardware performance measurements, data center security, data base administration and estimating project and program requirements.

Panel discussions will cover multivendor installations and effective management of computer operations.

Technical Sessions

Technical sessions will cover software performance measurement techniques, computer networks, Cobol source program optimization, managing computer programming projects, data communications and program verification.

Panel discussions will be held on point-of-sale and electronic funds transfer systems, software systems maintenance, on-line program development and software package evaluation.

Personal growth sessions will include lectures on the path to top management, developing effective communication, profitability, selling ideas to management, improving DP-user relationships and managing for tommorrow.

Special sessions will include lectures on defining and accessing DP career paths, selection of computer systems and data base management systems. Panel discussions on managing the small to medium DP installation and administering a small DPMA chapter will also be held.

Approximately 1,500 to 2,000 people are expected to attend the conference, according to a DPMA spokeswoman, and 45 exhibitors renting 65 booths have registered, with at least five more expected.

Further information on the conference can be obtained from Martin H. Bowerman, Director of Programs and Services, DPMA International, 505 Busse Highway, Park Ridge, Ill. 60068.

IBM Expected to Announce Plans For Satellite Entry in 60 Days

(Continued from Page 1)

we may or may not be talking to," an IBM spokesman said.

But rumors are currently circulating that Southern Pacific Communications Co. and/or U.S. Transmission Systems, an ITT subsidiary, may join IBM in CML.

The petitioners expect to file a complete proposal with the FCC within the next 60 days, according to the letter.

The proposal will consist of an "application by CML for authority to establish and operate a domestic satellite communications system and will specify the joint petitioners' intercorporate relationships, business plans and system design which we believe the commission will find to be compatible with its policies for domestic satellite communications.

"Upon approval by the commission of the CML applications, without any conditions which any of the joint petitioners believes to be materially adverse to it or to CML, the joint petitioners would expect to proceed with the inauguration of the domestic satellite service as promptly as possible," the letter stated.

Second Attempt

The letter marked the second try by IBM to enter the satellite business. Nearly a year ago, IBM and Comsat announced plans to acquire the one-third interest that Lockheed Aircraft Corp. and MCI Communications Corp. each hold in CML Satellite Corp.

Comsat General, a Comsat subsidiary, owns the remaining one-third interest.

Under the plan, IBM initially would own 55% of CML's shares and Comsat General the remaining 45%.

But on Feb. 6, the FCC denied the joint petition after several firms within the communications and data processing industries, as well as the Justice Department, filed complaints regarding the proposal.

The commission did, however, outline other possible alternatives under which it would consider a proposal. Comsat General and/or IBM could enter alone, or Comsat General could select a partner other than IBM.

Comsat General could provide a space segment to IBM under an arrangement similar to the one Comsat General has with AT&T, the commission said. If it did, Comsat General would have to choose between either a provision of space segments under a contract basis or a provision of common carrier services to the public.

Under the approach selected by the joint participants, however, Comsat General and IBM will remain partners in CML and acquire, as required by the FCC, one or more partners, with no partner owning less than 10% or more than 49% of CML Satellite Corp. or otherwise being in a position in which it could exercise de facto control.

The commission in February also outlined conditions applying to IBM regardless of what form its application took. These included the establishment of a "separate corporate entity" for domestic satellite activities and "reasonable and nondiscriminatory" connection of customer-provided communications equipment to the satellite facilities.

In addition, IBM's nonsatellite operations cannot promote the satellite services, directly or indirectly, although there could be an exchange of technical information between IBM and the satellite entity.

On the Inside This Week

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★ CW Special Report on Minicomputers and Small Systems Follows Page 24 ★

The New Memorex Data Mark: Already a Proven Performer.

The new Memorex Data Mark Module has been so well received in the marketplace that there are more Data Marks in field operation than those of all the independent competitors combined.

To produce a reliable product like Data Mark requires years of experience in manufacturing digital media, magnetic recording heads, and disc drives. Memorex's 12 years of experience led to the proprietary formulation and processing techniques for the recording coat of Data Mark that makes it unique. This tough "armor coat" significantly extends the Data Mark's durability and enables it to withstand increased stress of head landing.

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The Data Mark stores 70 million bytes and is available with the fixed head option. Either of the two configurations gives you the memory excellence from which Memorex has gained its reputation.

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See the Data Mark at Booth 1347B, NCC Show, Anaheim, May 19-22.

Jury Out in Landmark User-IBM Case

(Continued from Page 1)

by unscrupulous means.

"You have the power to tell IBM it is not above the law," he told the jury.

Christo emphasized that Catamore Enterprises is a small, family-owned and family-run concern.

On the opposite side, attorney Stephen A. Fanning Jr. of Edwards and Angell, the firm representing IBM, equated finding against IBM as finding personally against the four IBM account representatives and systems engineers who had been attached to the Catamore account and who had been witnesses in the case.

The case, which is regarded by some as a possible watershed since it involves unbundling, announced in June 1969, centers on what Catamore should have received from IBM in the way of support services and programming.

Catamore placed an order for a 360/20 BC-4 prior to unbundling, in September 1968. This order was upgraded to a DO-5 in May 1969. Installment was deferred until June, 1969; a Model 25 was placed on order in April 1970.

Catamore's charge of breach of contract contended it was promised support up through installation while IBM contended it did not do programming for customers before unbundling and did, in fact, deliver all that was expected of it in the form of a systems engineer's "work product," which Catamore pointed out was not ready to be run, or even coded or written into programs.

While Christo focused on IBM's failure to deliver the production control system and its use of marketing tactics such as locking customers in, burning bridges and overselling, Fanning noted IBM did not provide programming services before unbundling. It was up to the customer to perform the programming, he said.

Fanning painted a picture of a small corporation growing rapidly with the chief executive, "who didn't have very good captains."

Candidate Charges Possible Fraud

(Continued from Page 1)

election fraud" discovered in the U.S. since the advent of computerized election systems.

Tom Barnes, vice-president of marketing for CES, the firm that developed El Paso's election system, described Schneider as "a publicity seeker who is trying to use this case to get himself some new accounts.

"He's made claims of fraud and miscounts with no substantiation at all," Barnes said.

He argued that CES invests considerable effort providing security for its computerized voting system and described those procedures.

First, no source documentation is ever made available to a client, according to Barnes. "The programs went to El Paso in object deck form – in hexidecimal – and no one in El Paso County has access to the source code," he explained.

Although one CES programmer who was familiar with the source code went to El Paso to oversee installation of the system, Barnes said he had no reason to doubt the integrity of that employee.

Schneider claimed other CES officials told him that, although "no source documentation went to El Paso, clients wishing to have source documentation and program listings are welcome to it upon request."

This means that, if identical software is available in another jurisdiction, someone could have obtained it with ease for use in El Paso, Schneider contended.

A second level of security is provided through testing procedures employed at the local election board level, according to Barnes.

"About 10 days before the system is actually used in an election, the voting system program is tested in a bipartisan mock election. The ballots are counted and sealed with the results until election night, when they are counted again just before the actual vote count to assure the same results are obtained," Barnes explained.

Finally, after the actual votes are counted, the results of the original test are tallied once again to assure they are still identical.

"There is no way anybody could have changed the program," Barnes said.

Schneider claimed, however, only 25 ballots are counted during testing. "It's easy to fool the system with a sample of 25 when it's designed to count 60,000," he said.

In addition, Schneider claimed CES's EL-80 software, used to tabulate percentages for each candidate, does not count undervotes or overvotes – cases where a voter either voted for both candidates or no candidate.

From the Mouths of Babes . . .

(Continued from Page 1)

soon enough that her students are actually pulling her leg. Here's what I mean:

"What a 'bit' is has a very short memory on my end."

"Remembering eggacly what 'binary' means is something that is going to be forever on my mind."

"When I was reading the library book on computers I knew real good what they do, but since I closed the book, so did my brain."

Here is a charming remark with a new twist on an old familiar saying made by a little lassie:

"Once I saw a machine that looked like a computer. It looked just like a computer should look. And if it could have looked like anything besides a computer, your gas is as good as mine."

How's this deduction from a 10-year-old? "Take a good long look at a computer. Does it have input, output, a bit of binary? No? Then you are not taking a look at a computer."

When kids turn their attention to penning letters to various institutions for additional information, here's what happens:

"I have a bet with my girlfriend Nancy, who shall be nameless that more men do computering than girls. She thinks I'm against girl libbies. Straighten her out for me. I'm not a shove pig, and I hope you not neither! Thanks in advance for proving me. Bye, Harry."

"Could you please send me a real live picture of the big computer called Sage, so I can show the class for my report? If you don't send it by Friday, I won't be made. Sinsoily, Gail."

"I want to be in the computer line when I get out school. How important is math while I'm in the sixth grade? If you say very important, then throw this letter away. I'm not coming to your computer place. OK? Robert."

Some kids become quite emotional when enthused about an area of study. Take this chap's ideas, for example:

"From what I can see and think, the computer guys are very excited and thrilled when the computers come up with the right answers. They feel life is a bowl of cherris then. But just as soon as the answers are wrong, boy, life is a bowl of worms."

Possession of a unique imagination is not unique in the American classroom. Consider this bright thought by an 11-year-old laddie with the makings of a novelist:

"In the early days of inventing, when they asked how to invent a computer, what do you imagine the person said when they asked him? Yup! He rolled his deep eyes around his brain, twitched up his nose in thought and with a deep throat of gladness he yelled, 'ok.' "

Question: "Where are computers located?"

Answer: "On pages 34 through 40."

Do you ever wonder why teachers get feverish and giddy? It comes from chuckling and rolling in the classroom aisles after reading what kids write.

What better way to sum up this fun piece than with this 10-year-old tot's startling words:

"From now on, after learning all about computers, I'm going to think wonderful happy-that-you-made-it-so thoughts with a smile in my heart."

So will I!

Economist at IBM Antitrust Trial Explores Principles of Monopoly

By Edith Holmes
Of the CW Staff

NEW YORK – "We are approaching these questions the way a dog sniffs a bone," Judge David N. Edelstein last week told counsel on both sides of the U.S. vs. IBM antitrust case in connection with their efforts to elicit testimony on monopolized and competitive markets.

Having denied the IBM request for dismissal of the suit because he believes the case can be "efficiently and fairly tried," Edelstein clearly showed his dismay throughout three days of testimony by economist Dr. Frederick Scherer.

Repeatedly stating that he had not made an in-depth study of the computer industry, Scherer tried to discuss the general economic principles behind the concepts of monopoly, competition and "economically meaningful markets."

Counsel for the government and IBM also attempted to keep their questions general, but the court considered these efforts to skirt the issues. The judge frequently stopped the proceedings to clarify both questions and answers.

Scherer, an industrial organization economist who teaches at the University of Michigan and is now on leave with the Federal Trade Commission, testified that, in attempting to define any economically relevant market, he considers two general areas: the buyer's side of the market, in the form of the array of products available and whether these products are offered on a geographic basis; and the existence of competition among suppliers – whether a supplier can enter the market without meeting a substantial price rise and whether the ability to make a substantial substitution for products already in the field attracts new entrants to the market.

Scherer noted he has a tendency to define the economic market more broadly on the supply side, taking into account suppliers' technical ability to grind out products, their marketing approach and their reputation in the mind of the users of their products.

Suppliers Defined by Barriers

Suppliers in a relevant market are also defined by the barriers to entry in their marketplace, Scherer said.

These barriers – including patents, dominance of a key resource, production economies of scale, the accumulated reputation of a firm and the ability of larger enterprises to raise capital at lower interest rates and with less assumption of risk on the part of investors – become significant when they permit a firm or group of firms to raise the price of a product above its cost without attracting new companies into the marketplace.

Beyond patents and resources, many economists dispute which of these factors are genuine barriers to entry in a market, Scherer added.

Asked whether market share or the concentration ratio of a leading firm or firms could affect market structure, Scherer replied he believes that, the greater the concentration of leading firms in an industry, the greater their ability to maintain price over cost.

In trying to determine "price above cost" or, strictly speaking, monopoly power, Scherer said one must look beyond market share to the significant structural barriers to entry, the conduct of the leading firms in the field and the end performance of the industry in the marketplace.

The economist generally defined a "competitive industry" as one in which any particular seller is small with respect to the market or markets in which he participates.

Some markets can be quite competitive in structure, he said, yet have poor performance.

While competitive structure generally leads to a competitive market which, in turn, leads to good performance, this is a statistical relationship that doesn't always hold, according to Scherer.

Intent to monopolize a market is relevant from an economic viewpoint only in the sense that it communicates to potential sellers they may have difficulty entering the marketplace, Scherer said.

If it affects potential sellers in their decision to enter the market, then intent is relevant, he added.

Considerable study of an industry must be made before inferences about its markets can be reasonably drawn. Scherer testified he had no specific or in-depth knowledge of the computer industry on which to base such inferences.

The Case of the Fallen Ashtray

NEW YORK – For a brief time last week, a fallen ashtray caused IBM to suspect someone had broken into the room where it keeps its files for the antitrust trial under way at the U.S. District Court here.

A quick inspection of the room and its contents, however, convinced IBM counsel and Judge David N. Edelstein the suspicion did not warrant a formal investigation.

An ashtray sitting on a table had been knocked over between the time a young man who maintains the room for IBM left and the time he returned. But lead IBM counsel Thomas D. Barr noted "the files appear to be quite secure."

The windows to the room were not locked. A balcony runs alongside them but, while the windows are not excessively secured, the cabinets containing the IBM files are, Barr indicated.

"They are locked and bolted, bars down the slide, with padlocks as well as the key locks, and none of those appear to have been tampered with in any way," he noted.

The attorney added that most of the files are public documents anyway, with the exception of some digests and documents from other firms in the industry requiring confidential handling and present only for possible use in connection with the trial.

Barr said he has asked a complete audit of the files be performed, but added he expects nothing will be found missing.

Steps have also been undertaken at the court's request to fully secure the windows to the room.

Edelstein noted that, had the IBM room actually been broken into, he would have had to call in the FBI.

As Opportunities for Deaf Increase

Sigcaph Focusing on DPers With 'Invisible Handicap'

By Catherine Arnst
Of the CW Staff

WASHINGTON, D.C. – As employment of the handicapped in all areas rises with the establishment of affirmative action programs, the Association for Computing Machinery's (ACM) Special Interest Group on Computers and the Physically Handicapped (Sigcaph) is focusing on what is sometimes known as the "invisible handicap" – deafness.

Sigcaph's recent conference here on "Computing Careers for Deaf People" emphasized that deaf people can and do contribute to the entire field of data processing and that educational opportunities do exist to equip deaf people for this field.

Approximately 180 people, including 40 deaf professionals, attended the two-day conference.

Steven Jamison, Sigcaph's vice-chairman for the deaf and a consultant to IBM in this area, feels computing has an attraction for the deaf because it places less of a premium on the ability to hear than many other occupations. The ability of deaf people to concentrate in a noisy computer center is sometimes greater than that of hearing people, he noted.

Jamison's interest in opening up opportunities for the deaf is more than just professional – his son is deaf.

"Deafness is much more of a handicap than most people realize because it's invisible," he said. "People who are deaf from birth often do not learn to speak well. They don't pick up a large vocubulary and average a 10th grade reading level.

"Typically, they don't go on to college. Of the regular population, 50% might go on to higher education. Among the blind this number is 70%. For the deaf, it is 40%.

"So deaf people are not only hearing-handicapped, but also reading-, learning- and employment-handicapped," he said.

Situation Changing

Jamison believes this situation is beginning to change now that businesses must have affirmative action programs if they deal with the Federal Government. In Sigcaph, which has traditionally been dominated by concern for the blind, there is a growing involvement among deaf people, and the ACM has recently decided to have interpreters for the deaf at all its meetings [CW, May 21].

At the conference, the education opportunities available were especially stressed. Several sessions centered on programs offered at Gallaudet College, a school established in 1864 for deaf students, and the National Technical Institute for the Deaf NTID), a two-year technical school operating as part of the Rochester Institute of Technology (see related story on Page 7).

Although special attention must often be given to the deaf student's reading and language skills, Jamison said DP training programs for these students use the same methods as those for hearing students. For example, the faculty at both NTID and Gallaudet are chosen for their expertise in their subject area rather than any previously displayed ability to work with deaf students.

Spokespersons for both schools said 90% of their students find jobs in the DP field within a few months of graduation. However, Jamison said employers often balk at hiring deaf people because of their fear of the communications problem.

'Premium on Smooth Talkers'

Marilyn Galloway, Gallaudet's placement officer, said "there is a high premium in this country on smooth talking. Deaf people have to really work at communications, and it can be a real pain." However, she feels the problem is not insurmountable.

"The majority of students at Gallaudet use total communications – they speak, lip read, use sign language, finger spelling and paper and pencil," she said. "As long as it is a one-to-one situation, communications is not too bad a problem.

"Deaf people are only totally lost at large meetings and must depend on the notes of coworkers," she said.

Potential employers also fear they won't be able to provide continuing education for deaf employees. Jamison said a company can provide the deaf employee with either individualized training or interpreters, and Gallaudet gives follow-up support to companies that hire its graduates. Galloway admitted, however, that deaf people often get "dead-ended" in their job because of this problem.

Generally, though, the employment picture for deaf people is improving, Jamison said. He noted the Federal Government employes about 200 deaf DP personnel, and IBM, Control Data Corp., Westinghouse and many small private firms all actively recruit at Gallaudet.

Galloway said the school does not have enough graduates to fill all the positions offered. She admitted this interest is due to federal requirements to hire the handicapped, but added, "We don't care why the jobs are offered – as long as they're offered."

IBM has also started a coop program during the summer employing deaf students, with five working at its Palo Alto, Calif. plant last summer and 11 this year.

"But will IBM hire them?" Jamison questioned. "I hope it will. But they shouldn't be hired because they're deaf, but because they're capable."

More Than 30 Schools Offer DP Training for Deaf

DP training for deaf students is available at 30 community colleges in this country and several four-year schools offer small programs.

Two schools, however, specialize in teaching only deaf students – Gallaudet College in Washington, D.C., and the National Institute for the Deaf (NTID), located on the campus of the Rochester Institute of Technology (RIT) in Rochester, N.Y.

Gallaudet, the only college in the world designed specifically for deaf students, was established by an act of Congress in 1864. Students attend either four or five years, depending on their scores on the entrance examination. For those attending five years, the first year is used to improve reading and language skills.

Although there is no major offered in computer sciences, Gallaudet does have courses in both the mathematics and business administration departments which are computer-oriented. A major in computer mathematics is also available.

Students at Gallaudet are in the top 5% of all deaf students and David McGuiness, a professor of mathematics there, said "there is no reason why they shouldn't be as capable as any hearing person."

The only special condition a deaf student requires is that a teletypewriter be provided, since he cannot use the telephone, he added.

There are both definite advantages and disadvantages for a deaf student attending an all-deaf school, according to Marilyn Galloway, Gallaudet's placement officer. They are learning in a segregated environment, so there is a lot they don't learn, she said, but at Gallaudet they are given an identity and understanding of their problem.

Deaf students in hearing schools often have a hard time developing leadership, she added.

Professional Development

NTID is a two-year technical school offering an associate's degree and, on completion of the degree program, students can transfer to RIT for further training. There are approximately 25 students taking DP training, and several other majors include computer training.

DP Courses a Good Choice

Students in DP spend the first year training in operations and the second in programming. Donald Biel, an associate professor of DP, said "programming is an activity here, rather than listening to lectures. We use a lot of visual materials and labs."

DP is a good choice for deaf students, he said, because the technical language used in manuals has fewer subtleties of language with which to cope. He added, however, that the students do have a significant learning handicap because of their low English level.

"Education in general is geared for reading. In data processing, thick textbooks are usually used which we can't make use of," he said.

Despite this problem, Biel feels the quality of training students receive at NTID is equal to that of other schools. He previously taught four years at a regular university, and feels the students he has now are as capable as any he's had before.

"Just like any school, there is a cross-section of students," he said. "There are a few that are exceptional, a few mediocre and some poor students."

Georgia State Takes Practical Approach

ATLANTA – The mathematics department at Georgia State University here has developed a number of computer science courses that aren't all theory.

Among these is a graduate-level program designed to train secondary and grade school teachers in the use of computers for teaching mathematics, a spokesman for Georgia State said. As a final project, teachers enrolled in the course design and write interactive instructional programs in Basic or APL suitable for their own classes, he noted.

The university also supports its basic statistics courses, from freshman through beginning graduate levels, by an interactive simulation program called the Automated Statistics Laboratory (ASL). Using ASL, students perform sampling experiments which provide visible evidence of the distributions of the inferential statistics they study and apply, the spokesman commented.

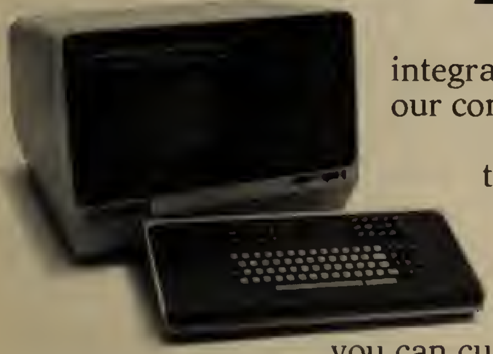
Several packaged computational programs are also used for regression and other problems involving large, realistic data sets, according to the school's representative.

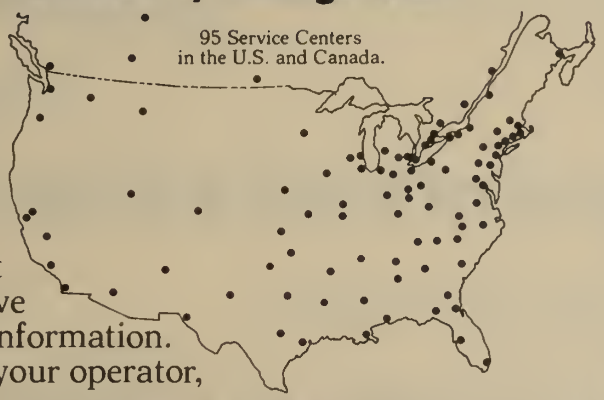
He added the school is currently studying the potential of California Computer Products' drum plotter as an instructional tool and an artistic medium.

The mathematics department recently approved a bachelor's degree in mathematics with a concentration in information systems, following the recommendations of the Association for Computing Machinery (ACM) for the training of specialists in information systems.

Containing 60 hours of course work in mathematics (calculus and higher mathematics), this program also requires 50 hours of exposure to information systems, including two programming courses, the spokesman said.

Georgia State has a Univac 70/7 with 67 terminal lines, 35 of which are dedicated for student use. The school's representative noted that some courses taught for Atlanta Public School System teachers use APL on an IBM/370 machine and that the mathematics department has terminal access to both these CPUs.





Vendors Claim Bias Favoring IBM Shown In Arkansas Bidding

(Continued from Page 1)

it's quite obvious they wanted it in this case from the beginning," he said.

According to Don K. Martin, director of the state's central computing facility in the finance and administration department, the letter of intent had nothing to do with the proposed Information System Plan, but was simply intended to reserve a machine for his shop, which he expected would run out of capacity in late 1975 or early 1976.

But Ellisor found it "more than mere coincidence" that the letter of intent sent out in April 1974 and the IBM proposal for the Information Systems Plan both referred to 370/158 multiprocessors.

As for the two consultants from IBM who helped the Isec, the committee lacked expertise in this area and private consulting help was too expensive, according to Thomas H. Berliner, Isec executive secretary.

Isec was well aware that taking on the free IBM consultants "had some serious implications, but was assured by IBM this would not be a marketing environment," Berliner stated.

"And I can unquestionably say that's been held to," he added.

"When we heard IBM was offering two people, we offered the same service but were turned down because Isec said it did not want to mix ideologies," Univac's Ellisor remarked.

The two consultants "certainly allowed IBM to have prior knowledge of the state's needs," he said.

The consultants were not involved in designing the RFP and benchmark, Berliner said.

Of the Benchmark's four sections, the accounting and federal grants management section held no advantage to IBM because it had not yet been run on the state's machines, he said.

The second benchmark involved a personnel payroll system which provided some, but "not a significant" advantage to the state's "encumbent supplier," Berliner said.

The third element was built around the state's major teleprocessing application, a criminal justice/highway safety system.

The fourth element consisted of a batch jobstream of existing programs written in standard Cobol.

At this point, Isec has allowed IBM to continue as the sole bidder for the contract, and the firm expects to perform the benchmark.

If IBM is successful, the Information Systems Plan will go to the legislature's Communications Committee for review. There it may face some uncertainty.

"We're asking a vendor to more or less write our specs for us, and we should be telling the vendors what we want done, and then letting them tell us how they want to do it," Rep. Joel Ledbetter, vice-chairman of the committee, said.

Delays Hamper Arizona Hardware Consolidation Plan

By Patrick Ward
Of the CW Staff

PHOENIX – Since the Arizona legislature decided to do something about "excessive" DP spending four years ago, a hardware consolidation plan has cut the number of state CPUs from 16 to six.

The state has set up a common data center in the Department of Administration to handle the business-oriented needs of state agencies. There are two other special-purpose centers.

But major departments have fallen behind schedule in switching over to the common data center, whose two Honeywell 60/60 CPUs are running at only 48% of capacity.

And the Department of Economic Security (DES), the data center's largest potential user, has just brought in an IBM 370/145 to help it during a conversion that so far has taken 22 months instead of the scheduled six.

The larger agencies have been slow to change over to the data center because of the quality of service it has provided so far, according to Rep. James B. Ratliff (R-15th Dist.). He is chairman of a select committee looking into the Department of Administration and its data center operation.

DES, for example, is responsible for unemployment and welfare checks and "has to be sure those things are going to go out," Ratliff said.

But Sy Rooen, systems and programming manager for DES, denied the agency was dragging its feet on replacing its IBM 360/40 and 370/145 with remote job entry (RJE) terminals linked to the data center.

"I'm all in favor of centralization; hell, I'm a taxpayer too," Rooen said.

DES brought in the 145 as an emergency measure because its 40 was processing "practically nothing but unemployment work," he said.

DES has already transferred many of its systems to the data center, is accepting bids for outside assistance and hopes to have the rest of its workload on the Honeywell systems by the end of the year or earlier, Rooen said.

That workload would boost the data center's computer utilization to about 88%, he said.

Raymond Long, director of the Administration Department, agreed that a lack of conversion funding slowed down DES and other agencies. But there were other reasons for the delays, he said.

User agencies tended to underestimate the size and complexity of the software inventory they would have to convert, he stated.

Some smaller users ran into trouble with poorly documented programs and this held things up too, he said.

And the data center and the user agencies have tried to make systems coming out of the conversion process as modern as possible, he said. This has also taken time.

Overall, then, Long said he feels the Department of Administration is progressing very well with consolidation.

The legislature had originally planned to set up one consolidated DP center, but later decided on at least three, he remarked. The concern was that a single center might grow beyond the economies of scale and become cumbersome in handling the users' peak loads, emergencies and changing needs.

So other than the Department of Administration center, which handles business applications for a variety of users, there is a criminal justice center and one for the Department of Transportation.

Long feels his center has "stopped the very rapid growth in small computers" that originally concerned legislators.

Based on the way the transportation and criminal justice computer operations have grown, Long feels the Department of Administration's data center should be saving about $1 million annually in hardware costs by next summer.

Woman Wins Fight for Her Life Against Social Security System

WALLA WALLA, Wash. – Mura Marshall has finally won the battle with the system handling her Social Security payments – the computer error which declared her dead has been corrected.

Marshall's Social Security payments had not been sent for three months because someone with a number similar to hers died. The digits of that number were transposed to become Marshall's identifier.

Once she discovered the reason for the delay, it took two months to convince authorities in San Francisco, where the computer is housed, that she "is very much alive."

Marshall, who is entitled to a monthly payment of $191, thought that as soon as she had informed the San Francisco officials of her well being, everything would be taken care of, but it was not until two months later, largely through the help of Fifth District Congressman Tom Foley, that any action took place.

Although Marshall has now received payments to date, she said she is "waiting and very nervous that they will not come on a regular monthly basis."

Maria Puig, on the other hand, has been declared dead not just once but twice through a computer error. A Miami resident, Puig was first declared dead in 1971. Social Security workers refused to believe she was alive until she walked through their door.

Last November, Puig was again declared dead. But a phone call was enough to resurrect her this time.

As Marshall declared after her ordeal, "It could happen to anyone."

Legal Interpretation of Insurance a Constant Problem

By Toni Wiseman
Of the CW Staff

ANAHEIM, Calif. – Insurance for computer users and suppliers and the accompanying problems in interpreting the law when products fail to perform continue to cause uncertainty in the relationships between user and supplier.

Technology introduces "new wrinkles" into "traditional fact situations, out of which legal questions have always arisen," according to Attorney Roy N. Freed, and it is these fact situations of which "we have to be aware in order to determine their significance."

For example, much study is needed in determining "types of risks" for insurance purposes to protect users and/or suppliers if a software program fails to perform and harm occurs to the user's business.

"One of the problems we have with insurance thus far is the inability to identify the types of risks to which we are exposed," he noted.

Today it is absolutely essential for people in the computer field to develop enough understanding to spot potential legal problems and, increasingly, legal strengths in the utilization of technology so they will be able to work effectively with lawyers on these matters, he noted.

It is particularly important, he continued, as an exercise in preventive law, to anticipate legal problems and involvements and take action to avoid them.

"It is entirely possible, in many cases, to eliminate apparent legal handicaps. In many situations, you will find the requirements in law came into being because of earlier technologies and reflected the characteristics of those technologies.

Regarding the determination of the type and extent of a problem, Freed said, "It remains for lawyers to come up with a list of possible risks of loss." This is admittedly hard, "since most people involved either as suppliers or customers would like to do anything other than identify risks."

A service bureau, for example, might transmit to its customer erroneous output in the form of streams of electronic impulses or in the form of erroneous printouts because of the use of an outdated data base or program, he said.

A supplier's lawyer must, therefore, identify the consequences to the customer, including indirect losses. He must then, in light of these possibilities, examine the insurance availability.

The next step, Freed said, is where the challenge arises, in examining policies to see whether they cover the risks identified.

The basic types of risks include loss of property, loss because of errors and ommission in the performance of the DP work (professional liability) and comprehensive general liability to cover exposure for harm that results to persons (physical or slander).

"I hazard a guess there are really very few software suppliers who are cognizant of their exposure and are providing for it financially, Freed said.

Product liability is an area which should generate great concern, he said, because the courts have been expanding the liability of manufacturers of products as time goes on. It is a matter of social policy to place on suppliers at large the financial burden of covering losses suffered by users of products.

"But, if you examine the policies regarding product liability, you find they're very precise and they apply to physical products delivered to customers where the loss occurred off the premises of the supplier," Freed noted.

"The definition of the term 'software program' becomes very important in this regard. If a creator of software programs delivers magnetic tapes or other computer media to its customers, are those products which should be covered by product liability insurance – which would mean creators of the software programs could get that type of insurance coverage – or are the media defined for legal purposes to be something else, like a technical manual describing a manufacturing or refining process?" Freed said.

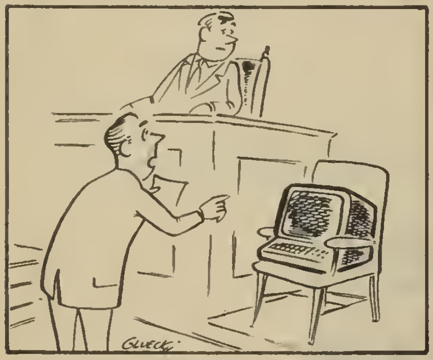
Freed also cautioned systems houses to examine their liability, since they are, in essence, marketing products and are warranting, under the Uniform Commercial Code, many qualities of the products manufactured by others, i.e., the hardware.

Systems houses, Freed suggested, should talk to their hardware suppliers and say "you have product liability insurance: I want you to have your insurance company name me as an 'additional insured' under your policy so I don't have to go out and buy insurance for myself."

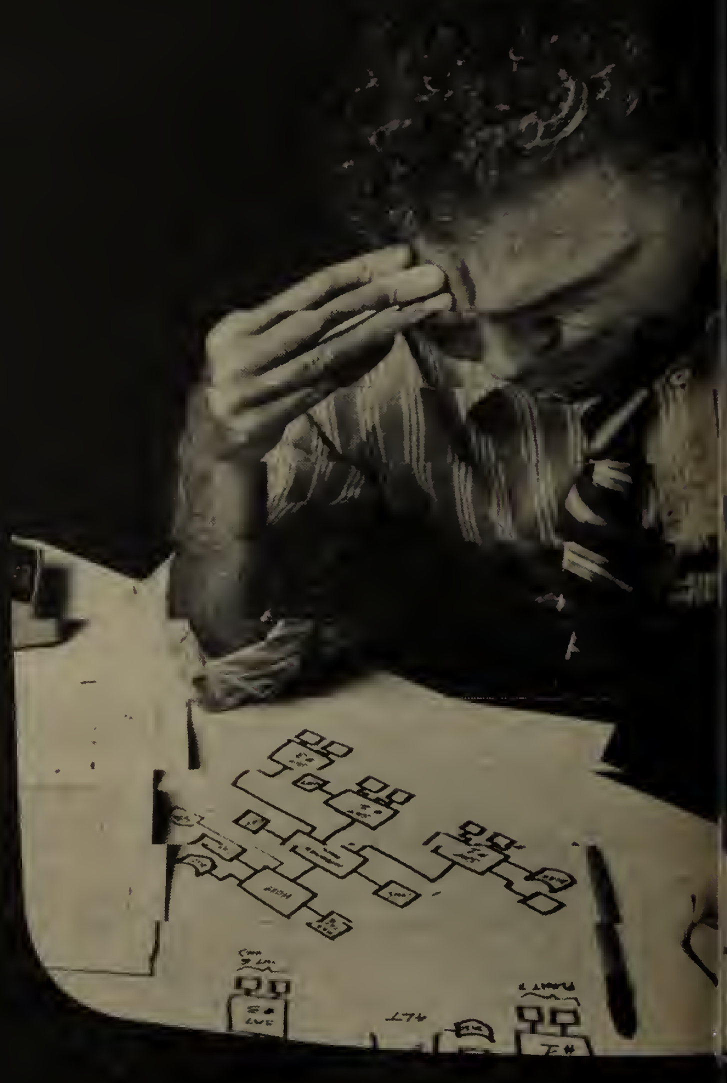
"You find, upon analysis, many of these approaches are appropriate, economical and essential," he stated.

"Underwriters in the insurance industry thus far are unable to quantify to their own satisfaction the magnitude of the risk involved in many information processing activities, Freed said.

"They don't know what the exposure is so they don't know how to set rates. And more of the rates are set arbitrarily and high," he added.



'I Object, Your Honor – This Computer Has Been Coached to Give This Evidence by Programmer or Programmers Unknown.'



Using Off-the-Shelf Hardware

Mitre Achieves Cost Breakthrough With CAI System

By John Hebert
Of the CW Staff

McLEAN, Va. – Combining inexpensive, off-the-shelf minicomputers, typewriter terminals and ordinary color television sets with innovative instructional techniques apparently has enabled the Mitre Corp. here to develop an individualized computer-aided instruction (CAI) system which overcomes previous cost barriers.

Cost evaluation of the Time-Shared Interactive Computer-Controlled Information Television (Ticcit) pilot system, installed at five community colleges and military training bases, has yielded cost estimates of 30 cents to $1 per student hour including maintenance on an amortized system, according to John L. Volk, head of Mitre's Computer Systems Department.

Mitre had spent $1 million of its own funds on initial development of the Ticcit system since between 1968 and 1971, when the National Science Foundation (NSF) began its $5.5 million sponsorship, Volk said.

The configuration achieving the cost breakthrough relies on two Data General (DG) Nova minicomputers connected to up to 125 Controls Research typewriter terminals and an equal number of Sony color television sets. It provides individualized instruction for as many as 125 students simultaneously, he said.

Alternatives With Savings

But "off-the-shelf hardware" of any kind can be used to keep costs down, Volk added, noting that Mitre has also experimented with two other hardware configurations with similar cost-saving results.

One of these systems used a DG Nova as a communications processor connected to a Hewlett-Packard 2000F in time-sharing mode.

The other, an IBM-configured system using any model 370 CPU, was estimated to be 25% cheaper than using IBM equipment with other CAI systems. This is a result of Ticcit's incorporation of instruction goals and principles – "it's an orderly system," Volk said.

The larger systems offer a wider range of capabilities, such as the use of graphics, but costs will not be in the same 30 cents to $1 per student hour range, he added

Other CAI and computer-based education systems, one in use at the University of Michigan and other nearby institutions on a time-sharing basis, normally incur costs between $2.50 and $8.00 per student hour, not including terminal costs, Karl L. Zinn, a research scientist and associate director of the Merit computer network at the University of Michigan, said.

The Merit system, for example, uses a general-purpose IBM 370/168 with a variety of languages and peripheral equipment including teletypewriters and CRT, alphanumeric and graphics terminals, Zinn said.

The vast discrepancies in cost between Ticcit and other CAI systems lies in the fact that Ticcit is intended primarily for introductory subjects on the community college level, where there is not a great deal of complexity in subject matter or high student enrollment, although such capabilities are there – for higher costs – if they are needed, Volk said.

Program materials used by students working with the system are called "learner-controlled courseware" and were developed for the Ticcit system by instructional psychologists and curriculum specialists at Brigham Young University (one of the Mitre pilot sites) and a team of engineers and computer specialists at Mitre.

The courseware is broken down into a conceptual instructional hierarchy built around a specific set of objectives using a rule/example/practice approach, "much the same way as a teacher teaches," Volk said.

Students Control Pace

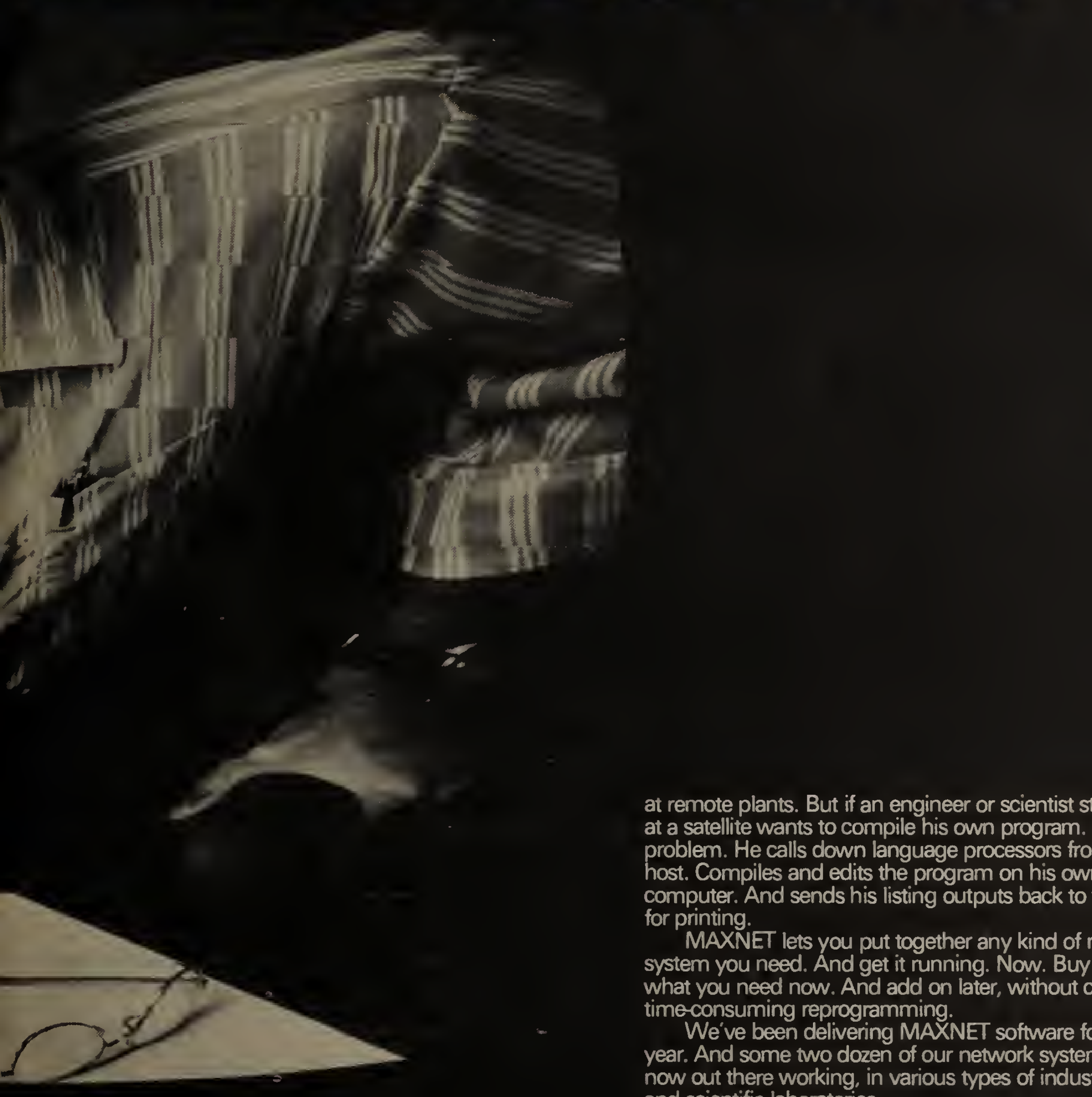
With Ticcit, students control the pace of their instruction individually and are given the freedom to study instructional material in the order and at the complexity level that suits them best.

Instructional material is presented to students on the Sony color television sets. Students select the instructional material they wish to study and respond to questions presented them on typewriter-like keyboards. The system not only tells students immediately if their answers are correct, but also gives them help in solving problems and advice on what to study next.

The advantages of the system are manifold, Volk commented, and include an extensive information base ("possibly the largest contiguous base of material ever developed"); self-paced, individualized instruction; and adaptability over different learning systems because of flexibility in the courseware, which gives each user the ability to author additional material and add to or revise existing material.

Plans are being made to introduce the Ticcit system into a school for the deaf in Washington, D.C., next year, and Mitre is also developing a Ticcit system to be installed this year in a suburb of Buffalo, N.Y., where Ticcit will bring individualized instruction into the homes of handicapped, homebound children, a Mitre spokesman said.

Mitre Corp. and the NSF are in the process of trying to find a company to market the completed system, Volk said.



Editorials

Setting the Record Straight

Unfortunately, the public is still all too willing to believe computer technology should be blamed for social misdeeds. Two separate incidents, each vaguely blaming the computer, support this point.

In a glaring implication, NBC News said a computer breakthrough had made it possible to compile and transmit an individual's personal data "to compile swiftly a file."

The breakthrough alluded to, apparently, was the Department of Defense Arpa net, which has connected different CPUs at various university, military and research facilities for some time. The Arpa net is basically a transmission medium which developed and utilizes packet-switching.

To blame the Arpa net for enabling someone to transmit confidential data is akin to blaming the phone company for having provided the facilities that make obscene calls possible.

The second incident occurred when a New Hampshire credit bureau sent out 60,000 letters offering recipients the sole copies of their credit file. The letter was titled "Is Your Privacy in Jeopardy?" and it warned that those not willing to pay $7.50 to get possession of their file would run the risk that it "becomes part of a large computerized data bank which may allow unlimited access by thousands of people."

Blaming computer technology for the way it is manipulated by some is a recurring theme that keeps rearing its ugly head. It seems to use the same kind of logic as the ancient rulers who used to kill the messenger who brought bad news.

It is up to all of us to set the record straight, especially among members of the general public who are willing to believe their worst fears about the evil power of the big, bad computer.

Hard Look in the Mirror

The great McDonald's/Cal Tech contest caper of 1975 is history. In the best tradition of harmless rip-offs our society enjoys, a group of students had the last word over Ronald McDonald and his corporate buddies.

Best of all, nobody got hurt in the operation. McDonald's got the proverbial million dollars worth of publicity and more. The university got a scholarship, thanks to Burger King, which wanted a piece of the publicity action.

The students paid for their CPU time, and they donated their prizes to worthwhile causes. And a second set of prizes were awarded to "real" customers. Obviously, McDonald's treasury was hardly dented.

So it was a bit disconcerting to read that McDonald's felt the caper was a "contradiction to American standards of fair play and sportsmanship."

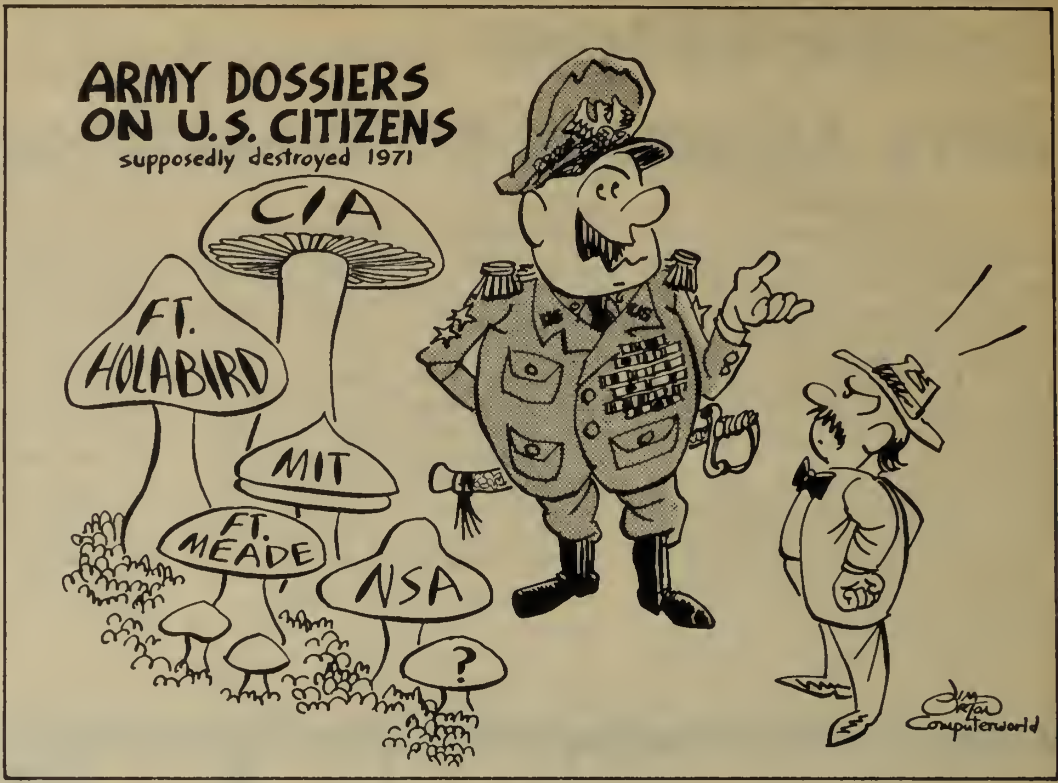
And it is hard to identify with the corporate spokesman who said the students detracted from a contest designed to give customers a chance at goodies in a time of economic stress.

Even more discouraging was a comment from a reader who called the scheme "repugnant," saying it was awful that these senior computer science students would soon be at the forefront of our next generation.

What the Cal Tech students really did was cause us to take a hard look at ourselves in the mirror. The students were telling us the old "something for nothing" contest gimmick is not sacred and even an IBM 370/158 can be used for harmless fun.

Those who took offense have probably forgotten the pranks they enjoyed when they were young.

There are enough serious issues confronting the DP community. Let's not lose the ability to laugh at ourselves. Sometimes it is good medicine.



'No Problem, Everybody Knows They're Poisonous . . . '

Letters to the Editor

Does Cal Tech Caper Represent Ethics Expected in DP Future?

I was seriously upset when I read the story, "Students Best Burger Bonanza" [CW, June 4], a report about a group of Cal Tech computer science students who snookered a McDonald's Restaurants contest by stuffing the contest box with computer-generated entries.

First of all, if the costs of generating the entries (printed on an IBM 370/158) were counted up, I am sure the enterprise would have been at best a break-even deal.

Second, the idea that it was indeed a profit-making venture is based solely on the fact that the students paid nothing for computer time or supplies – which in turn is based on the fact that the public provided that computer time and those supplies.

In other words, they had no expenses because the public paid their expenses, while they collected the proceeds. This is repugnant.

Even more repugnant is the thought that these were senior computer science students at a nationally recognized institution who will presumably be at the forefront of our next generation of computer people.

Are these the ethics that we can expect to be exercised in our immediate future? I find the prospect rather disturbing.

L.F. Wygant

Schiller Park, Ill.

Frequency Analysis Critique Valid

Jerrold L. Dykstra's response [CW, June 4] to my article on frequency analysis [May 21] contained a very valid critique of many systems currently in operation.

There are now available a number of system design and programming techniques which not only improve programmer productivity, but simplify program maintenance, documentation, etc. If these tools of the trade were utilized at the start of each system's development and carried through each phase of modification and revision, many of the computer horror stories carried in the general press wouldn't have happened.

But reality continues to rear its ugly head; systems designed years ago to do something only vaguely similar to what they currently attempt to do, partially documented and "basically" debugged, still abound in great numbers.

Dykstra pointed out that I did not emphasize the use of frequency analysis in the creation of the system from which I took an example of poor coding sequencing. It's hard to argue with a man when he's right, but the record-identifying codes used in the example did have logically functional reasons for being.

When you take a piece of code out of the context of the system within which it operates, you sacrifice system comprehension. In attempting to keep the article brief, I excluded an explanation of system flow and operation.

The resequenced code is slightly harder to follow because of our "logical" compulsion to arrange values in ascending order, but if the frequency analysis had been included as comments in the source listing as suggested, the rationale of the coding structure would have been apparent.

Louis Mills

Petaluma, Calif.

Respect Closes 'Open Door'

The June 4 issue of *Computerworld* carried reader commentary entitled "IBM Privacy Principles Fail to Pass Practical Test." It was written by a former IBM employee, Larry Nye, who made the point that he was not permitted to review the file of an Open Door investigation (an IBM procedure for addressing employees' complaints) conducted at his request. This is correct.

The investigation on his behalf required extensive interviews with many other employees. To permit his review of the statements others made in confidence would violate their privacy and ultimately erode the Open Door process on which all our employees rely.

One essential ingredient of the Open Door process is the knowledge of the initiator and those questioned that their statements will be held in strictest confidence by the executive assigned to the case. Information obtained in the Open Door investigation is not used for any purpose other than the resolution of the circumstances surrounding the individual's complaint.

We believe that this is the essence of respect for individual privacy.

Frank T. Cary
Chairman of the Board

IBM Corp.
Armonk, N.Y.

Worth a Thousand Words

The photograph on the front page of the May 21 issue is graphic evidence that one picture is worth a thousand words.

If my memory is correct, there was a Nicholas Katzenbach who served as U.S. Attorney General during the Johnson Administration, when the Attorney General's Office was preparing antitrust action against IBM.

Are we to believe it is pure coincidence that Katzenbach now appears in the role of IBM's defender?

Not only is IBM a dangerous monopoly, it leaves no stone unturned in its plan to remain so.

William Coleman Jr.

Salt Lake City, Utah

Letters to the Editor

Room in the World

What does Herb Grosch have against the Institute of Electrical and Electronic Engineers (IEEE) publishing a computer journal [CW, May 28]? If the same people were involved in an independent journal not connected with the IEEE, he would probably be enthusiastic.

I dare say there is room in the world for another software journal, even if it causes an existing journal or two to go under. I personally find the Association for Computing Machinery journals less than exciting and, as near as I can judge engineering journals, the IEEE products seem clear and coherent.

It seems to make little sense to object to a publishing effort on principle rather than on content. If the electrical engineers choose to feel that software is part of their domain, the rest of us DPers are not likely to lose by being exposed to additional points of view.

Gary Floam
Montreal, Canada

A Perfect Example

Gopal Kapur's interesting article [CW, May 28] on structured programming illustrated two major problems facing DP publications.

The first is our Madison Avenue technique of, for lack of a better comparison, putting old wine in new bottles (that is, taking historical concepts and reissuing them emblazoned with new names); the second, a susceptibility to produce reams of nonexposition.

Kapur cannot be faulted for the first problem. The transition from "subroutine programming" to "modular programming" may well have carried the seeds of "structured programming." One might paraphrase: A set of steps explicitly describing a logical function would, by any other name, debug as easily.

On the second point, Kapur succumbed, as have many before him, to contributing to obscurity. He raised several descriptions of "structured programming" with so little depth as to explain nothing.

He did indicate one IBM publication is a "definitive work . . . addressed . . . to design concepts." Unfortunately, we never shared any of those concepts.

It's too bad Kapur never told us what "structured programming" is. He suggested a course outline for a one- or two-week training program to teach a subject which remains inadequately defined.

Carl E. Gallagher
San Francisco, Calif.

Flexible Spouses

In the June 11 article on the Alaskan network, Don Cowan "quipped" that his employees need "flexible wives."

I assume from his comment Cowan is not looking for female employees – or, as my husband suggested, perhaps Cowan was implying that men are not "flexible" enough to be husbands of his employees?

Carol Loeb Mir
Baltimore, Md.

Checkup Time I

In November of 1971 I was keynote speaker at the first Munich "SYSTEM" conference, now a biennial fixture. In the talk and in an exciting press conference that followed, I made a series of predictions about the disappearance of mainframe IBM competition worldwide, during the next decade. As Munich is Siemens country, and I had some painful things to say about the parallels with General Electric in the States, there was quite a furor.

Since then I've used the material over and over in talks and written pieces, with updates. The original pitch was made more than half a (hardware) generation ago, and since IBM is girding for the *coup de grace*, it looks like time to do a recap and survey the current position.

First, though, two definitions. By "computer company" I mean an outfit making mainframe hardware capable of imposing system architecture on a significant number of user data banks, data networks or number crunchers. "Significant" means, say, 1% of the world market, and draws the attention of the plug-to-plug boys and the software suppliers.

By "disappear," I mean either explicit or covert but obvious-to-customers withdrawal from the marketplace. There may be an announcement of new directions, a sale of important facilities or installed-machine base, a merger with another company. Above all, major development of the next generation of equipment is halted.

Now, which computer companies have disappeared, and how do the survivors stand? Chronologically, in order of my Munich dates, the picture is as follows: AEG/Telefunken was to succumb in 1972, and was in fact forcibly merged with Nixdorf early that year. In 1974, after Nixdorf losses from the number-cruncher business became insupportable, Siemens was "asked" to take the Telefunken problem over, by the German government.

For 1973, I predicted the departure of Xerox, Philips and National Cash – the latter with the footnote, "an easing away; a withdrawal to the point-of-sale and cash register business." The Philips case is accurate; in or about 1973 it pulled back from the mainframe area and now does accounting machines, terminals and the bottom end of the Unidata spectrum (about which, more subsequently). Xerox (XDS) continues to announce new modifications of its beginning-of-the-decade line, but in terms of my definition, especially as regards a major next-generation super-storage, ultrachip development, has given up. Whether this occurred in 1973, or in 1972 or 1974, an outsider can't say; it still takes orders, still services its installed customer base. But, except as an expensive hobby for the parent Xerox management – or a face saver – I claim it has evaporated.

NCR is much healthier today under new top management than in 1971. The company still turns out Century systems and announces low-end improvements. And it is venturing into terminals, intelligent and not so, as well as specialized point-of-sale store equipment. By my definition, though, and especially in terms of whether to expect a billion-dollar radically different mainframe system in the 1976-78 period, I think I can say National Cash has "disappeared" – probably more in 1974 than in 1973, to use the Cheshire Cat model.

This is the first of a series of four columns of mainframe company viability.

Herb Grosch

User Specification Problems Can Be Handled Wisely

The situation in which a computer-application user provides specifications with which the computer professional disagrees has been a problem area for years – and, from anything that can currently be seen, will be with us for plenty of time to come.

True, the growing service-industry segment does provide some DPers with the capability to tell the user to take his business elsewhere if he persists in being ridiculous. And this is the policy advocated by some, such as Arthur Rauch of Florissant, Mo.

The Taylor Report

By
Alan Taylor, CDP

Others argue that, once the user has been warned by the DPer – and has to sign off on having received the warning – then everything is all right.

Between these extremes however, a number of constructive methods of handling the situation came out of the recent Taylor Report questionnaire on the subject [CW, May 28]. These involved the impact of such situations on programming methods, auditing methods and management functions, as well as on the problem of how to deal with the first collision with the user himself.

Expected Trouble Notification

Corlene Ellis, information systems project manager in Jacksonville, Fla., pointed out that one key item in the notification to the user that something is wrong with his specification is often left out. She insisted the notification should concern itself with the *potential hazard*, rather than with the technical details of the wrong specification. Even the details of the (hopefully) correct alternatives provided by the DPers are less important than the danger description. And, like most respondents, she wanted the user's decision to be documented, particularly if he persists in wanting things his way.

The Ellis technique does mean there is more DPer work involved. The problems have to be isolated, their probable magnitude have to be estimated and the implications of errors occurring and being detected or undetected have all to be worked out.

Yet, to be fair to the user, he has to have realistic answers to all these questions before he can be really blamed for insisting on his instructions being carried out.

The work involved in the Ellis approach, then, appears to be sufficient to make the matter a two-step project. First is the attempt to get the user to change voluntarily; the second is the documentation of the probable hazards, of the available alternatives (together with their costs), all in a single user package for the signoff.

Selection of Alternatives

The problem of selecting alternatives in such situations also got some attention. One very constructive approach came from Susan Lewis, a senior systems programmer in Waltham, Mass. Her point was that the specification should be implemented in a *modular* manner (which doesn't necessarily mean using "modular programming").

In this way, the system stays flexible so that, if the situation changes, it becomes clear (although not necessarily easy) as to where to make the appropriate changes to remove the danger that had been ignored, although foreseen.

The thinking behind the Lewis approach is good. Factually, the responsibility of coming up with perfect alternatives or else accepting user specifications as gospel is asking too much of everyone. It's too black and white.

Selection of programming techniques to provide a compromise method of handling these disputes makes excellent sense – and costs little.

Testing, Auditing Procedures

The next step in program development after the actual programming concerns the testing and auditing preparations. Here again further constructive work to minimize user specification problems can be performed.

D.A. Brandt of Downers Grove, Ill., suggested the use of warning messages in the tests and audit routines. This presupposes the setting up of suitable test data in the simulated runs and suitable tests with live data.

Such provisions should alert both the user and future systems maintenance people to the problem occurance and to the weaknesses in the handling provided. I can see some tact being used in the message composition, but again the approach has merit and does provide additional safeguards.

It also makes it clear that testing and auditing should go beyond specification matching.

In combination, these three approaches – danger description, hooks for system change and test and audit warnings – add up to a constructive, well-rounded approach to the problem of user-DPer conflicts.

It was not the only approach suggested, however. Walt Williams, an MIS manager of Bohemia, N.Y., brought another fact into play by pointing out that users and DPers are not the only people involved.

Management – in general and specifically in both systems and user areas – should realize that getting a workable system is a joint responsibility. The abdication of either party from a decision-making role in favor of being allowed to second-guess the results later is simply asking for trouble.

Williams, while pinpointing the management problem correctly, unfortunately did not provide any suggestions on what sort of a management structure encourages such an interplay of responsibility. And no-one else came up with the management focus on the subject.

Hopefully someone will take up the problem of management structures for minimizing poor computer system specifications some time. Until then, we will have to stick to the three points of danger descriptions, hooks for system changes and test and audit warnings to be the DPer's contribution toward the minimization of system problems. Considerable improvement in the situation should result from their systematic use.

Considerations of Law Vital to Systems Design, Use

From a Legal Viewpoint

Computerworld will periodically carry a column written by Roy N. Freed on the legal aspects of computing.

Many of our readers will recognize Freed as the attorney who conducts workshop courses on contracting for computers and software programs and who has been writing and speaking on the unique legal aspects of computer-communications technology for the past 15 years.

Freed's observations will cover much of the same ground treated in his wide-ranging course on "Legal Aspects of Computer-Communications Technology" at Boston University's Metropolitan College and in his various lectures to technical and legal audiences.

Readers are invited to submit topics for discussion in the columns. They are asked to recognize, however, that Freed will not use the medium to furnish legal advice on specific situations and will only treat topics generally.

By Roy N. Freed

Special to Computerworld

Welcome to a new column with a legal flavor. I plan to treat here the wide range of extremely varied, unique legal ramifications of computer-communications technology.

I hope the material not only will help computer specialists perform their duties more effectively, but also will provide them with enjoyable intellectual stimulation.

This column is intended to alert computer specialists to legal considerations pertinent to computer system design and use. By giving them insights into the legal perspective, they should be better equipped to protect their employers or clients by satisfying legal requirements routinely in the course of system design.

Hopefully, they will be helped to identify potential legal problems early enough so they can be avoided and to communicate better with lawyers, with whom they should be interacting to forestall or correct those problems.

Incidentally, their watchdog role might involve not only looking for legal difficulties that might arise from planned computer use, but also being alert to the advisability, from a legal point of view, of using a computer when none was contemplated.

The general legal subject areas to be treated will include contracts, the liabilities of suppliers and users for harm resulting from system use or nonuse, evidence and recordkeeping requirements, privacy, protection of software programs from unauthorized use, antitrust and communications regulations. These are the basic legal fields treated in my book, *Computers and Law – A Reference Work.*

However important privacy appears to be to many of you, in a number of cases other legal points compete strongly with it for professional attention. Readers must be aware of the entire gamut. The legal aspects will be examined also in the context of particular industries or general areas of use, such as banking, securities, and medicine, to show how persons operating in them should look broadly for relevant legal factors.

As suggested above, I want to discuss not only the legal difficulties or requirements lurking in computer applications, but also the legal reasons for computerizing information-processing functions that otherwise might be left to people. As the technology evolves, increasingly it will be found to provide significant new protections for various legal rights previously somewhat vulnerable.

It represents a significant means for reinforcement of those rights that must be identified as being available in a wide variety of situations – marketers, take notice of new opportunities! These include, of all things, such areas as privacy and medicine, to name only two.

Readers are invited to write me concerning types of legal questions that come to mind or material treated in the column they want expanded on or explained. Discussions in the column must necessarily be general. It is not permissible or feasible to furnish legal advice with regard to particular situations. Rarely can all the pertinent circumstances be communicated in a brief letter.

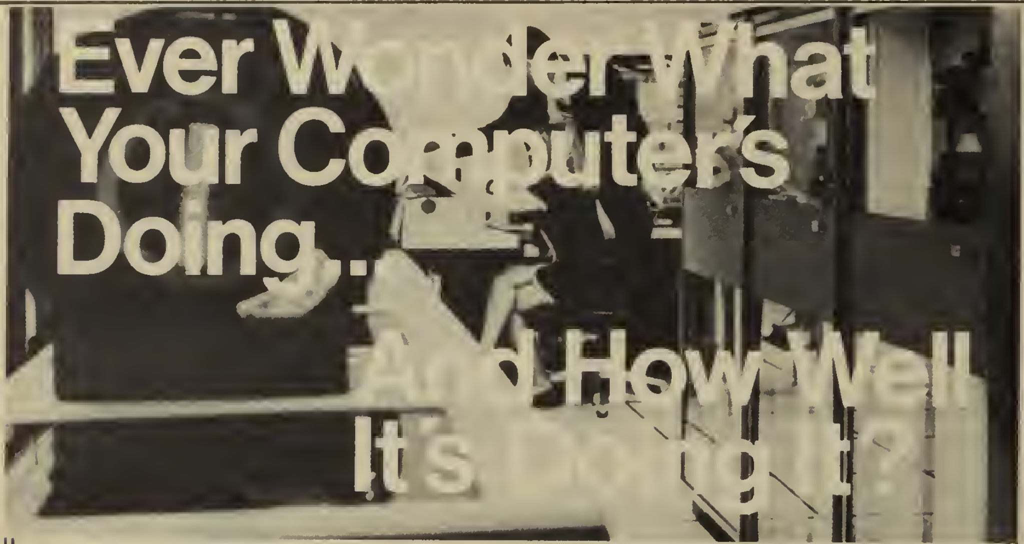
An effort will be made to cover points raisied by readers that seem to have broad significance.

The basic theme of the series of articles will be that legal considerations frequently can be as important elements of system design as technical factors; that treatment of those considerations early can avoid unnecessary expense, delay and inconvenience for users; that computer specialists are the ideal legal problem-finders and hence should be sensitive to potential legal considerations; and that computer specialists should develop an understanding of the general legal approach so they can communicate with lawyers easily and effectively.

This column will not not try to make computer specialists into lawyers, but it will attempt to sensitize them to the normal legal approach and the general legal environment. Readers must not expect many, if any, hard and fast legal rules to guide them. That simply is not the way the legal system works.

They will get, instead, indications of types of arguments that can be made under various types of circumstances in order to try to achieve desired legal results. They thus will get suggestions of measures or approaches to take in the hope that those desired results will be available to the system users.

It will be quite a change from the somewhat more positive world of system design, maybe even a welcome relief. I hope so. Try it. I hope you'll like it.



Random Notes

'PHI Payroll II' Feature Ties Application to IMS

TEWKSBURY, Mass. – An optional interface for the PHI Payroll II system from Wang Computer Services allows operation under IBM's IMS/VS data base environment.

With the feature in place, Payroll II performs all payroll and personnel processing against a single, unified base of all human resources data. While the various applications CALL the common base, they retrieve only the information required for the functions they handle, Wang noted.

The interface is being distributed free with the Payroll II package, a spokesman added from 836 North St., 01876.

Rates of Return on Portfolios Measured On-Line or in Batch

WALTHAM, Mass. – Corporate money managers can calculate rates of return on-line or in batch mode for individual or aggregate portfolios by a variety of asset types by utilizing the Xport Performance Measurement (XPM) service now on the Interactive Data Corp. remote-computing network.

XPM monitors common and preferred stocks, bonds, discount instruments, miscellaneous assets and cash.

Reports show both time-weighted and dollar-weighted rates of return using calculation methods recommended by the Bank Administration Institute, a network spokesman said from 486 Totten Pond Road, 02154.

Service Puts Bank Transactions On Fiche Between Statements

PRINCETON, N.J. – Commercial banks utilizing the DP capabilities of National Computer Analysts, Inc. (NCA) for their customer accounting can now answer checking account inquiries quickly and accurately with the start of NCA's Linear Response service. It puts cumulative account information on microfiche so that bank clerks have current status information between statements.

Use of microfiche as the output media provides human-readable data without the bulk of conventional paper, a spokesman noted from NCA on U.S. Highway One at Farber Road, 08540.

UCS Adds IMSL Fortran Routines

KANSAS CITY, Mo. – The Fortran subroutines packaged by International Mathematical and Statistical Libraries, Inc. (IMSL) of Houston are now available in batch mode on the United Computing Systems, Inc. (UCS) remote-computing network, based at 2525 Washington, 64108.

Columbia Unit Finds

Students, Staff Savor SPSS Support

By Robert P. Taylor
Special to Computerworld

Like many graduate institutions, Columbia University's Teachers College has found faculty and student use of computing as an analytic tool both increasingly necessary and increasingly expensive. To stem demands for access to pay-as-you-go outside services, the Center for Computing and Information Management Services (CCIMS) – the DP center at the college – decided 18 months ago to install a statistical analysis package on its Burroughs B4700 computer.

After a careful comparative review of capabilities, scope and hardware size requirements, the Statistical Program for the Social Sciences (SPSSG) was selected. No version existed for the B4700 hardware line, so the most recent IBM 360 version was acquired from the owners, the University of Chicago.

Despite some misgivings about implementing an efficient version of such a large (27,000 Fortran statements) scientific system on the decimal-oriented B4700, the conversion implementation of SPSSG into Fortiv (the B4700's best Fortran) and BPL (the B4700's systems language) began.

Birth of a System

Within nine months the work was completed and the system was being used by students and faculty in a production version. Within 12 months of beginning the conversion, monthly student/faculty use of the B4700 had shot up to 10 times the level of its pre-SPSS days, and the pressure to use outside computing installations had appreciably declined.

Further enhancements to the package have since been implemented and academic usage has continued to increase, improving the quality of academic activity and saving the institution money at the same time.

These benefits and savings were anticipated and had been used to justify the implementation costs. What began to happen shortly after implementation was completed, however, was not anticipated, but greatly added to the savings coming from SPSS availability – administrators "discovered" the package was a valuable reporting tool.

Department heads, cost-center heads and committee chairmen in recent years have sharply increased the urgency and number of their requests for activity, financial and cost-analysis information in formats and relationships completely outside the scope of production DP reports already programmed. To these requests have been added an increasing number coming from various state and federal agencies asking for peculiar arrangements and selections of data on facilities, hiring practices, academic programs and characteristics of students and/or employees.

Typically, such requests are for one-time reports because either the head, chairman, or administrator wants a different kind of quantity of information or wants it in a different format each time a report is needed. Attempting to satisfy such requests clearly requires some kind of utility reporter package, and the college had increasingly utilized Burroughs

(Continued on Page 17)

Industrial Firms Use 'Mini-Miz' For Nova-Based Accounting Runs

ENGLEWOOD, Colo. – Industrial firms need a 24K Data General Nova under RDOS to implement manufacturing Mini-Miz, an on-line cost accounting/inventory system now available from Automated Quill, Inc. (AQI).

Functions supported include a bill-of-material processor, a work-in-progress processor and finished goods inventory control. Accounts payable, accounts receivable, billing, payroll and financial reporting are also part of Mini-Miz, AQI said.

The bill-of-material processor provides parts explosion, including both raw materials and subassemblies, and generates a shortage list of inventory items required. The estimating logic covers labor, raw materials and outside services, a spokesman added.

The work-in-progress processor tracks each job from purchase order to completion, and it tracks cost of labor, raw materials and outside services as well. Budgeting reports at both the consolidated and detail level are provided, according to AQI.

The payroll processing modules provide withholding calculations for multiple states or other taxing jurisdictions. Union reporting is included in this part of Mini-Miz if required, the spokesman noted.

The financial reporting capabilities of the package encompass general ledger, income statement, balance sheet printouts and reconciliation of the user organization's checking accounts.

The estimating subsystem considers quantity discounts in determining the most effective reorders of raw materials. An ability to "cost out" union fringe benefits on an hourly basis and departmentalization of the general ledger to three levels are other minor but useful aspects of the system, AQI added.

The minimum 24K configuration supports a single user accessing one of the application subsystems. At least 32K storage and adequate disk space is required for multiple, concurrent users, AQI said.

Fortran IV source code of the "100 or more programs" that make up Mini-Miz is ready for immediate delivery at a one-time license cost of $16,500. AQI is at Suite 7, 3501 South Corona St., 80110.

Net Provides 'Compass' for CPA

ANN ARBOR, Mich. – Certified public accountants (CPA) can control in-house operations as well as manage client work more efficiently with the Comshare Professional Accounting Systems and Services (Compass) capabilities now on the Comshare remote-computing network.

Compass provides access to a range of programs, including both Time and Billing and project accounting systems applicable to the user's own operations. A staff scheduling system is to be added "soon," Comshare noted.

A Practice Applications Library supports standardized accounting calculations for working with client financial data. Capital investment analysis and financial analysis are the two largest areas currently, but "the library is dynamic and ever-growing."

Securities calculations and statistical analysis are other areas already heavily represented.

A general ledger system to support the CPA's internal accounting is also part of Compass. As with many independent ledger packages, the Compass system allows the user to specify the chart of accounts and the reports to be generated.

Through tie-ins with CPA professionals across the country, Comshare expects to regularly update its Compass capabilities to keep pace with constantly changing legal requirements and accepted accounting standards, he added.

Programs in Compass are modular and self-standing so they can be implemented when the user is ready, without necessitating his involvement in the whole system at one time.

The Comshare network is nationwide; its corporate headquarters is at the Wolverine Tower, 3001 S. State St., 48104.

'ABC' Available

FAIRFIELD, N.J. – Report generation may be as simple as laying out the format and contents of the desired output and entering the data input with the ABC system now available on the remote-computing facilities of Informatics' Data Services Division.

ABC is simpler than most tools designed for the non-DPer, since it doesn't even require "English-like" code.

Informatics is at 6 Kinsbridge Road, 07006.

Free 'Debugger' Adds No Test Overhead

BERKELEY, Calif. – Programmers working in Assembler or any of the higher-level languages that generate object code can gain a test bed in which to develop projects with the Debugger package now being distributed by the Information Systems Division at the University of California Administrative DP Center.

Debugger differs from other trace macros and debugging packages because it does not add any code to the user program being tested, a source at the division noted.

This means that no overhead is added to the application program that might affect either its running time or the way it handles data, he added.

The test bed supports execution of IBM 360 load modules or object decks interpretively, with options to print out register contents and core contents.

User Control

These printouts may be for all instructions or only a specified selection, and the execution may run until a program check occurs or for a certain number of iterations through a portion of the instructions.

Debugger runs under DOS or OS and requires 5K bytes of the partition in which the user program is being executed.

A copy of Debugger can be obtained from senior programmer John Fitz at the center's Information Systems Division, 2200 University Ave.

Ledger Gains Budgeting

DES PLAINES, Ill. – The general ledger package introduced by Systems Engineering Corp. (SEC) last fall (CW, Oct. 30), has been extended by the vendor to include a budgeting subsystem.

The basic ledger system addresses standard accounting problems such as producing a trial balance as often as desired. Maintaining trial balances for this month and last while the books are still open and managing the books of the using organization on a cash and accrual basis are other capabilities of the system, SEC said.

The budgeting subsystem interfaces with the ledger system to produce departmental worksheets and to extract expense items from the ledger.

This extension of the original package can also produce budget comparisons by department, type of expense, responsibility area and – in the case of a conglomerate – by subsidiary company as well.

The package requires a 32K or larger CPU with card reader, line printer, four tape drives and 150 cylinders of direct access storage. The need for tape drives can be reduced by increasing the amount of direct access storage available for intermediate files.

The system has been implemented and is available from SEC in two versions, one for IBM 360/370 hardware, the other for Honeywell CPUs.

Cost of the SEC general ledger system, including the budgeting subsystem, is $5,000, which covers documentation and 40 hours of installation as well as program code. SEC is at 2500 East Devon Ave., 60018.

'Score' Manages Tasks on SEL 32

FORT LAUDERDALE, Fla. – The SEL Core-Resident Executive (Score) software from Systems Engineering Laboratories, Inc. (SEL) is designed for minimum configurations of the SEL 32 minis.

Featuring multitasking support, Score also includes I/O drivers for peripherals and provides direct operator level control for program assemblies and executions, in addition to load/dump and debugging capabilities, SEL said, from 6901 W. Sunrise Blvd., 33313.

'Oasis' DBMS for Universities Modified for Large-Scale 360s

WINDSOR, Ont. – Educational administrators can work on-line or in batch mode with large-scale IBM 360/370 equipment to access any file or to integrate previously stored data to support new applications with a new release of Oasis, a data base management system now available from the University of Windsor.

Developed originally by Stanford University for small IBM 360s, Oasis has been modified here at Windsor's Computer Center to take advantage of the extended facilities of the larger mainframes, a university spokesman said.

The system provides the non-DP-oriented user with a terminal command language to get information when it is wanted without having to go through conventional program development cycles.

Equally important, probably, are the password and device protection parameters which prevent unauthorized use of the system or access of the data, the spokesman added.

Data protection can be defined down to the data element level and that might be a single character – used as a classification code, for example – on any given file. Custody of data and decisions about its confidentiality remain under control of assigned departments or individuals, Windsor noted.

The basic logic for Oasis – implemented as a master task under IBM's OS – requires 80K of main storage. The on-line portion of the system requires an additional 150K. Space needed by the application program varies with the user's needs.

Oasis is available to secondary and higher-level educational institutions in object code form for an initial charge of $4,000 plus $3,000/year for maintenance, starting at time of installation.

Postal code for Windsor is N9B 3P4.

Dialog Gains Industry Data

SUNNYVALE, Calif. – Immediate answers to questions about the U.S. industrial economy are now available to users of Lockheed's Dialog remote information retrieval service.

The Economic Information Systems (EIS) data base has been added to the service through the joint efforts of Lockheed Missiles & Space Co. and Predicasts, Inc. of Cleveland.

EIS includes information on 116,000 establishments operated by 67,000 firms with current annual sales of more than $500,000, which accounts for 90% of total U.S. industrial activity, according to Dialog spokesmen.

The data includes names, addresses and telephone numbers as well as information on the type of industry, employment and sales volume of each facility. The service provides information about plants according to geographic location, industry and size depending on the search parameters specified by the user.

The facility has been described as somewhat equivalent to data published by Census and "County Business Patterns" bulletins. Unlike Census publications, however, the EIS data base builds on public records and identifies all large firms and establishments, including corporate ties linking parent companies to branch locations.

Searches of the EIS base may be framed within the limits of any desired region, state, city, county, sales area, Standard Metropolitan Statistical Area, Business Economic Area, Zip Code or telephone area code. Combinations of these parameters may also be utilized, Dialog noted.

Output from searches of EIS or any of the other Dialog data bases may be printed on a user's teletypewriter or displayed on a CRT terminal.

Dialog personnel can be reached through P.O. Box 504, 94088.

Distributors Depend on 'Darts'

LOS ANGELES – Wholesale distributors outgrowing small in-house configurations such as IBM System/3 can utilize the power of an IBM 370 instead by subscribing to the Distributor's Automated Real-Time System (Darts) now available through CMS Industries, Inc.

Darts is a table-driven software system linked to IBM's CICS teleprocessing monitor stored in a 370/145 at the CMS computer center here.

Without front-end programming costs, the system provides support for immediate generation of shipping and invoicing documents and periodic preparation of related accounting reports.

Order entry is monitored through screen displays and promptings on IBM 3270s or Four Phase terminals at user locations. Editing of the new input includes checking the credit status of the customer and the availability of the items requested.

Shipping papers generated are in bin location sequence in order to simplify and therefore speed up warehouse operations. Once another entry indicates the items have been shipped, Darts generates fully extended invoices, CMS said.

The periodic reports generated by Darts range from inventory management through accounts payable and receivable, and they include general ledger and sales analysis as well, the vendor said. The inventory support is primarily a monitoring function.

The payables subsystem provides for both initial creation and maintenance of an open item file.

The receivables processing includes aging of outstanding items and documentation of unapplied cash, CMS said.

There is no such thing as a typical Darts user, CMS said. Currently, usage ranges from 5,000- to 250,000 line item/mo, and costs range from $2,500/mo to $100,000/mo.

CMS Industries is at 5332 Harbor St., 90040.

SPSS Supports Staff, Students

(Continued from Page 15)

Reporter and a special report generator built into the payroll system to answer these requests prior to the implementation of SPSS.

Like most utility reporters, the Reporter and payroll report writer were good at extraction, summarizing and detail listing, but poor at crosstabulation, a form of reporting which is often more valuable than details or summaries.

Thanks for the Complement

Almost as soon as the implementation of SPSSG on the B4700 was completed, an administrative user discovered the powerful breakdown and cross-tabulation capabilities of that package nicely complemented the detail and linear presentation capabilities of the other report packages.

After persuading a programmer to create a version of the student data file suitable for SPSS accessing, the user then proceeded on his own to utilize this new tool extensively to analyze that data in crosstabular fashion.

The results were so useful that other major data files on personnel, facilities and academic program were similarly made accessible to SPSS. Use of these SPSS file versions by nonprogramming end users began immediately and has continued to expand ever since.

Satisfying Results

The results have been both user-satisfying and cost-saving to the college. Users are able to write their own reports with only minimal and occasional assistance from the programming staff, despite the complexity and diversity of many of the reports needed. Not only do they find SPSS an excellent complement to Reporter, they find it easier to use.

The Burroughs version of SPSSG is maintained according to SPSS guidelines originating with the owners so that users can follow the documentation published by McGraw-Hill. In that book, *SPSS*, users can find complete descriptions of all capabilities of the package and how to use it.

Other Possible Uses

The need to spend time preparing user documentation has also thus been virtually eliminated and amounts to no more than keeping users informed of any required B4700 control cards needed to execute the system.

The double utility of SPSS has suggested the need to look for a comparable potential in other software as well. Consequently, the college is looking carefully at the possibility of using Reporter – till now seen as an administrative tool – for instructional and research purposes.

After all, there may be a sequel to SPSS's success as an administrator's tool called "Can a Poor Little Administrative Package Make Good in the World of Instruction?"

Taylor is director of the Center for Computing and Information Management Services at Teachers College, Columbia University.

One of Terminal's First Users

IBM 3770 Performance, Savings Please Service Firm

By Ronald A. Frank
Of the CW Staff

KING OF PRUSSIA, Pa. – One of the first users of the IBM 3770 terminal system is pleased with its operation and has saved money compared with earlier IBM terminals.

Four 3770-type systems are currently operating at Shared Medical Systems, a DP service company for hospitals. Two of these are operating in the home offices here and two others are installed at hospitals for use by Shared Medical's customers. The first two 3770 systems were installed about six months ago.

The IBM terminals are accessing a hospital accounting data base stored on an IBM 370/158 and 370/168. The mainframes have four Memorex 1270 front ends handling the terminals, using Tcam in binary synchronous transmission mode.

The 3770s replaced 2770s at the DP center and, for a time, Shared Medical operated both terminals concurrently to compare timings between the machines.

"There are more features on the 3770 that are desirable," Gil Comeaux, programmer analyst, said. While keyboard corrections were virtually impossible on the 2770 without a CRT, the 3770 makes corrections without having to rekey an entire message, he said.

The 3770 is about $200/mo less expensive than the 2770 for the same basic capabilities "and you still end up with a faster device," Comeaux said. The cost works out to about one-third less than the monthly price for a 2770, he noted.

The 3770 was one-to-one replaceable and required no new coding, although there were some startup problems. Shared Medical has a 3774 80 char./sec bidirectional printer and a 3775 line printer.

Also attached is a 50 card/min reader and a diskette unit on one terminal that the company is "experimenting with" for 3740 input, Comeaux said.

The terminals at one of the remote hospitals, in New England, operate at 600 bit/sec binary synchronous mode space compressed, which tends to drive the 80 char./sec terminal close to its rated speed, he said. This comes reasonably close to its rated capacity of a 3774 because of the space compression, Comeaux explained.

The 600 bit/sec lines transmit to a network hub point where they are multiplexed into a 2,400 bit/sec data stream using a Timeplex multiplexer.

'Very Little Wrong'

Shared Medical has found "very little wrong" with the character printer on the 3770 systems. It has very few moving parts and goes to the next print position on the line regardless of where it is, Comeaux said. This bidirectional action eliminates wasted time for returning to the margin at the end of each line.

The 158 and 168 mainframes operate under OS/MFT – which might seem strange, but it fits the Shared Medical application, he said, describing the files as a sort of "string batch-processing" operation. But the company is investigating MVS Release 3 for a possible upgrade. Testing is also under way on Tcam Release 8.

Shared Medical has looked at an upgrade for the 3770s to switch to the Synchronous Data Link Control (SDLC) protocol, but this would mean getting rid of the Memorex 1270s and replacing them with 3705s using Vtam with NCP3, which is the latest release of the Network Control Program, he said.

Easy Solution

While the 3770s can work on lines operating up to 4,800 bit/sec, the highest Shared Medical has gone is 2,400 bit/sec with the local terminals.

Some initial problems with printer timing were found on the 3775 at 2,400 bit/sec. The printer was not printing the correct characters, but this turned out to be a microprogramming problem which was easily corrected by an IBM change on the microprogramming diskette.

There was also a data set compatibility problem which was traced to a lead that had been allowed to float on the 3770 instead of being grounded. It was relatively simple to ground the lead; it took about three or four days for IBM to isolate the problem, which was introducing noise to the incoming signal to the terminal, Comeaux said.

Current plans call for replacing 100 IBM 1050 terminals in the Shared Medical network with 3770s if the experience with the remote terminals proves reliable over the coming months. One of the local 3770 terminals has been operating about 16 hours per day without a major mechanical breakdown, he said.

Intertel Adds Multiplexer Option

BURLINGTON, Mass. – Intertel, Inc. has introduced a time-division multiplexer option for the company's 9,600 bit/sec modem.

The option, which is compatible with Intertel's existing diagnostic and network monitoring equipment, is said to provide savings in line costs for high-speed data network users.

A single printed circuit card that plugs into the 9,600 bit/sec stand-alone modem, the multiplexer enables users to mix 2,400-, 4,800- and 7,200 bit/sec data streams from terminals or colocated modems. Special features of the multiplexer include built-in self-test circuitry that automatically checks out the unit and status indicators that display data terminal interface signals for each channel.

Individual carrier control is available on each multiplexer channel for polled networks. No software or hardware modification is necessary to use the multiplexer option, the firm said.

The multiplexer option is designed for use with Intertel's MCS9600 modem, designed to operate on unconditioned 3002-type transmission lines and the dial-up network. MCS9600 users are said to save the installation cost and monthly charges for specially conditioned circuits as well as the downtime required to re-engineer a conditioned circuit when a problem occurs.

The error rate for the MCS9600 modem is said to be as good as other 9,600 bit/sec modems that require C1, C2 or D1 conditioned circuits.

An MCS9600 modem with the multiplexer costs $10,750. The same unit on a three-year lease is $228/mo.

The multiplexer option is $1,050 or $28/mo, but can only be used with the modem, Intertel said from 6 Vine Brook Park, 01803.

University Puts GA Mini to Work On Univac 1108 Communications

SALT LAKE CITY, Utah – Utilization and convenience always have been major problems with large, batch-oriented computer systems.

No matter how efficiently a batch job stream is structured, the full power of the mainframe computer rarely is used and users generally have to wait a significant turnaround time for the results of their programming efforts.

Directors of the computer center at the University of Utah, who operate a profit-making service here, found themselves in just such a situation recently with their 262K Univac 1108 computer.

They felt on-line communications capability had to be added to the mainframe to distribute the power of the computer to users throughout the campus, thus better utilizing their hardware investment.

William Boam, system specialist at the computer center, was assigned the task of implementing a campuswide network. The system had to accommodate two modes of operation: on-demand, so users could access any of the 1108 processors on a priority basis, and time-sharing, with modified remote batch terminal routines.

There were two different ways to add communications capability to the mainframe. A package could have been purchased from the manufacturer, but installation of such a system usually involves substantial cost and software involvement.

An alternative is to use a minicomputer as a front-end communications processor. Since all communications operations can take place outside the mainframe, there is no need to modify the system software. And since it generally is easier to program a minicomputer, it therefore is easier to implement a front-end system.

Boam chose the minicomputer solution to implement his planned network of 128 on-line asynchronous terminals. He selected an SPC-16/85 minicomputer from General Automation for the front-end processor.

The front-end processor is configured with 24K words of core memory, with memory protect and automatic restart functions and a paper tape reader and punch. Boam wrote his own software, including emulators for four 32-channel communications multiplexers. He linked the SPC-16 to the 1108, using the general-purpose input/output facilities.

There were a few challenges in interfacing the machines, however.

First, the 1108, purchased in 1966, was not TTL-compatible. "We chose to design the special interfaces to get around this problem ourselves," Boam said. "This meant we had an in-house capability for repair, rather than having to send to California for someone.

"Installation of the system took longer than expected," Boam added, "but his was certainly not the fault of the SPC-16, which arrived here in mid-summer. First the teletypewriters were late, so we couldn't verify our software until early fall. Then the telephone company had a strike and we couldn't get enough dial-up equipment. But we had 18 lines up by December and we now have 48 lines."

The system now accommodates up to 2,500 students per quarter on several different types of terminals. It also handles the billing at the pharmacy of the University Hospital.

CDC CRTs Linked to IBM CPU Form Danish Wholesaler's Net

COPENHAGEN, Denmark – A network of Control Data Corp. communications terminals linked to an IBM mainframe is enabling a building hardware wholesaler here to control inventory, serve customers and respond to suppliers.

Carl F. Petersen is the largest supplier of hardware to the Danish building industry. Its 18 warehouses stock 200,000 different items, ranging from door hinges and brackets to large woodworking machines, for a total inventory of 240,000 units.

The 93-year-old, family-owned enterprise operates an IBM 370/145 mainframe with all-CDC peripherals, including 56 CDC 211 and 711 display terminals. The terminals are located at company headquarters, warehouses and branch offices.

Several of the terminals are installed at the offices of major suppliers and customers in an experiment to determine the value of tying those functions to the network for on-line ordering, inventory information and communications.

A user of computers for less than five years, Carl F. Petersen started with an IBM 360/40, upgraded to a 370/145 and then began investigating terminal offerings for a communications network. CDC was selected to provide initial increments of the network. Six local and four remote terminals, plus support equipment, were installed in early 1971.

Within the next three years, 46 more CDC terminals were added, six with associated printer equipment. Other IBM peripherals were replaced by CDC units as the system was expanded.

The system now includes 11 single and double-density disk drives and all the necessary controller and polling equipment. It has 870M bytes of on-line disk storage.

Promotes Expansion

In charge of DP operations is Carl F. Petersen, great-grandson of the founder, who has promoted expansion of applications and the network. He has persuaded several of the firm's large suppliers and customers to install CRTs so they can access the computer.

Petersen views the terminal installations at customer and supplier sites, especially those which also do business with his competitors, as a meaningful service that reduces paperwork and improves communications.

Users of the terminals are clerical personnel, stock clerks, salesmen, purchasing agents and management. Their functions include entering orders, initiating customer invoices, receiving customer payments, ordering new stock, initiating payment to suppliers and querying sales, inventory or financial statistics.

Terminal Transactions

Petersen attributed the firm's record inventory turnover in 1973 to the terminal network. Approximately 150 additional employees would have been required to handle the transactions represented in the turnover, he said.

OEM Modem Card Designed for 3002s

NEWPORT BEACH, Calif. – A MOS/LSI data modem card from the Collins Radio Group of Rockwell International was designed for use on 3002-type unconditioned lines. All modulation, demodulation and timing recovery functions are performed in four MOS/LSI chips.

The TE-2400 modem is for original equipment manufacturer (OEM) applications. It is compatible with Bell 201B and 201C modems and with Collins TE-236.

A strap option permits the modem equalizer to be inserted into the transmitter or receiver circuits. Modulation is compatible with both conventions of CCITT V.26. The digital interface is in accordance with RS-232C and CCITT V.24.

The TE-2400 is suitable for use in polled networks and point-to-point systems. The modem has fast synchronization, and the request-to-send/clear-to-send (RTS/CTS) time can be set to 1-, 10-, 20- or 150 msec.

The modem card costs $675 from the firm at 4311 Jamboree Road, 92663.

Double DUV Debuts on Dataroute

OTTAWA – A data transmission method known as Double Data-Under-Voice (DUV) has been introduced on the Canadian Dataroute by the Trans Canada Telephone System.

Dataroute is a data communications service offered by the Computer Communications Group of the Trans Canada Telephone System. The first Double DUV link recently went into service between Montreal and Toronto.

Double DUV sends two identical data streams, transmitting them simultaneously over different routes. At the receiving end, a comparator selects the best parts of the two signals, sending a continuous error-free stream of data to a computer or terminal.

"We have taken the Data-Under-Voice concept developed in the U.S., improved it dramatically and are now the first in the world to put it into service," a Trans Canada spokesman said.

Double DUV transmission will be an integral part of data communications in the Dataroute service and will be a major transmission medium used by Datapac, the packet-switched intelligent network now being developed by the Computer Communications Group.

The DUV equipment has been designed to carry a high-speed 1.544M bit/sec signal, whereas group bandwidth facilities presently used in the Dataroute carry a 56 kbit/sec signal. This means the addition of Double DUV to the data network will greatly increase the capacity of carrying data signals.

IBM 370 Add-On Memory Systems: Intel® Delivers.

Intel is the leader in semiconductor memory technology. We've been pioneers in the semiconductor memory business since 1968. While we've been making headlines with our high speed random access memory devices and microcomputers, we've also been quietly building a reputation for performance and reliability in the IBM 370 add-on memory business.

We've already shipped over 100 IBM 370 compatible memory systems to OEMs and leasing companies. Until now, they've been doing the marketing and service for us.

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Minnesota	612-474-5939
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Intel IN-7158 Memory System for IBM 370/158 Uses the latest in semiconductor memory technology, Intel high speed 4K random access memory devices. Provides memory expansion to 8 megabytes in a single frame. Twice what is available from anyone else and the IN-7158 is available now. Can be expanded in 1/2 megabyte increments up to 4 megabytes, and in 1 megabyte increments from 4 to 8 megabytes. Dial out failing memory (including IBM Memory) in 1/2 megabyte increments. An Intel microprocessor chip, "Intel's computer on a chip," monitors memory system status, controls our "smart" maintenance panel and "score keeps" any problem areas!

Intel IN-7145 Memory System for IBM 370/145 Memory expansion to 2 megabytes in the same frame. Expandable in 128K byte increments. A shared port feature eliminates the need to replace IBM memory, even after 256K bytes have been attached. Dial out feature in 256K byte increments allows the operator to replace failing memory including failing portions of IBM memory. This guarantees maximum up time.

Intel IN-7135 Memory System for IBM 370/135 Memory expansion to 1 megabyte in the same frame. That's twice the capacity available from IBM. Because of our unique "swinging door" packaging approach, no additional space beyond IBM's service area is needed. Dial out failing Intel memory in 64K byte increments, including IBM's failing memory.

All Intel Memory Systems are fully field upgradable and include Intel's own diagnostic software.

When you're planning for IBM 370 memory expansion, call Intel Memory Systems first. We'll be glad you did. So will you.

For complete information on our memory systems contact any of the sales offices listed here or write Intel Memory Systems, 1302 North Mathilda Avenue, Sunnyvale, California 94086 (408) 734-8102.

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Bits & Pieces

Scan-Data Key Entry Gets Communications Capability

NORRISTOWN, Pa. – Scan-Data Corp. has brought its key-to-disk system into the "distributed processing" arena by adding a data communications capability to its Scan-Data 2250/2 Key Entry System.

The Scan-Data 2250/2 is a stand-alone key-to-disk system that supports up to 32 Scan-Plex II keystations and handles data entry applications ranging from production data capture to remote file access and updating.

The communications adapter will allow the 2250/2 to communicate with IBM 360 and 370 systems with Hasp, Btam, Qtam or Tcam by emulating the IBM 2770, 2780 and 3780 data communications terminals.

Transmission rates range from 1,200- to 9,600 bit/sec in a half-duplex mode. Communications software is supplied at no charge.

The data communications adapter leases for $100/mo on a two-year lease. Maintenance is $20/mo.

Initial deliveries are planned for August from the firm at 800 E. Main St., 19401.

Portable Punch Handles Tab Cards

AUSTIN, Texas – The Model 404 portable electric keypunch from Vari-Punch, Inc. is said to automatically punch and print numeric data on standard 80-column tab cards or multiple-copy tab card sets.

The unit may be interfaced to operate from signals generated by badge and card readers, medical instruments, weigh scales, thumbwheel switches, etc.

All control functions, including tab, space, hold and return, can be actuated remotely via an interconnecting cable. The unit can punch alpha as well as numeric.

The Model 404 costs between $1,530 and $1,913 from the firm at 10210 N. Interregional, 78753.

Reader Produces 100% Image

MOUNTAIN VIEW, Calif. – The Q307 microfiche reader from Quantor Corp. produces a 100% blowup image of an 11-in. by 14-in. printout page, but the unit requires only 16-in. by 12-in. at its base, the firm said.

The unit has seven element lenses and no fan and is guaranteed to exceed 750 hours lamp life, the firm added.

A Q307 with either 24X or 42X lenses costs $244 from the firm at 520 Logue Ave., 94043.

Terminals Access Either CPU

Sigma 9, IBM 370 Pairing Benefits Firm

By Walter R. Welch
Special to Computerworld

By placing a Xerox Sigma 9 alongside an IBM 370/168, Motorola, Inc. has been able both to improve service to batch terminal users and avoid duplication of hardware costs.

The company has linked the Xerox CP-V operating system and IBM's Hasp so batch terminal users linked to an IBM mainframe can receive output from the Sigma and vice-versa.

The Sigma 9 was initially brought in to handle time-sharing tasks, but Motorola decided to exploit the opportunity afforded by sitting it next to the 370/168.

The "cohabitation" was motivated by several objectives:

- Eliminate redundant communications costs. Without some centralized terminus for remote job entry (RJE) lines, any RJE user wishing to access both systems would be required to either dial up or set up an operator-activated modem switch or provide dual communications. Motorola's users don't have to do that.
- Eliminate presence of any unnecessary peripherals, particularly unit record equipment.
- Allow users of both systems to easily transport data between systems.

Since Motorola is not generally in the business of operating system development, we assiduously avoided any extensive modifications to either software system. We sought to exploit currently available software to its practical limitations.

Currently, in the Motorola Midwest Area Computer Center at Schaumburg, Illinois, is an IBM 370/168 with 3M bytes of core.

The production operating system is VS2 and Release 1.6. Hasp controls 12 synchronous RJE ports, which terminate in a Memorex 1270 communications controller.

Applications running on the 168 are TSO, IMS, batch and various on-line applications using Tcam as a communication interface supporting order entry, purchasing, receiving, inventory control and part departments.

The Motorola Midwest Sigma 9 configuration includes 160K words of core, four 7605 communications controllers and 88 lines. We are currently running the B00 version of the CP-V operating system.

IBM Compatibility Enhanced

There are several areas in which Xerox has released software with the objective of enhancing compatibility with IBM systems. First, the American National Standards (ANS) tape facility allows an additional IBM mode of labeled tape creation or input.

A second major area of Xerox/IBM interconnection is the 7605 bisynchronous communications controller and Hasp-compatible Intelligent Remote Batch Terminal (IRBT) software.

At Motorola, ANS tape is the preferred medium for the transfer of large amounts of data between systems. ANS tapes are also the preferred medium when data from one system (usually the Sigma 9) is used as input to a batch job.

ANS tapes pose no difficulties at all for CP-V when it is called upon to read a tape created by the 168. The job control language (JCL) is straight-forward and the accessibility of ANS tapes from the peripheral control language (PCL) processor is particularly handy.

Tapes generated by CP-V show some oversights, namely the unchangeable default of 800 bit/in. when a 1,600 bit/in. tape has, in fact, been generated; also, CP-V fails to set a block flag. Both of these major problems were patched locally.

A final and significant weakness in this link is the lack of availability of 6,250 bit/in. tape drives on the Sigma 9.

Relatively high-speed Ebcdic communication between Xerox and IBM is made available through the Xerox IRBT package. Under this scheme, the CP-V machine appears as a remote workstation to the Hasp host system. At Motorola, a "modem eliminator" is used to interconnect the two synchronous communications ports, enabling a 9,600 bit/sec link. Another 7605 port is assigned to a second IBM computer (a 360/65) in Weisbaden, Germany.

The first benefit of such a connection, which is available without programming, is the addition of the Sigma line printer to the 168. During peak printer usage conditions, output may easily be routed to the Sigma, where it is once again queued for output. The spool-to-spool transfer, although time-consuming, does effectively increase the print capacity of the 168.

A second benefit of the slave IRBT package is derived with the aid of some programming. On CP-V, a program was written, called Route, which takes as input CP-V files, attaches the appropriate VS JCL and submits the completed result to the 168.

(Continued on Page 22)

Entrex 280-1 Key-to-Disk System Designed to Replace Keypunches

BURLINGTON, Mass. – The System 280-1 from Entrex, Inc. is an entry-level key-to-disk system for users who want a low-cost, high-performance keypunch replacement, according to the firm.

A typical System 280-1 with five terminals leases for $868/mo, including maintenance, on a one-year lease. This is about the same cost as leasing five IBM 029 keypunches, Entrex said.

The System 280-1 has most of the features of the Model 280 that was introduced a year and a half ago, Entrex said, but the 280-1 output editor has seven instructions compared to the 15 on the 280 output editor.

Unlike the 280, the 280-1 does not support remote terminals or binary synchronous communications and its 1.8M-byte disk capacity is not expandable, a spokesman said.

The system 280-1 central processor contains up to 32K bytes of core memory and can be configured to support up to 12 Data/Scope keystations. Keystations can be either typewriter or 029 keypunch style. Each terminal displays up to 360 characters on its CRT screen.

Hardware includes the 1.8M-byte disk, a choice of two tape drives (9-track, 800 bit/in. or 9-track, 1,600 bit/in. and/or one of three different printers which may be used with the system.

Entrex is at 168 Middlesex Tnpk., 01803.

The Entrex 280-1 is a more spartan version of the firm's Model 280 which was introduced about a year and a half ago. A 280-1 system with five keystations is said to provide the capabilities of a key-to-disk system at about the same monthly lease cost as five IBM 029 keypunches.

Datapro Finds IBM-Equivalent Disk Drives Please Users

DELRAN, N.J. – Users of IBM-compatible disk drives are generally well pleased with their overall performance and reliability, despite the fact that only about one-third of the users reported the installation and maintenance of these drives has been completely trouble-free.

Those are some of the findings reported in "All About Plug-Compatible Disk Drives," a 22-page report from Datapro Research Corp.

The ratings were assigned by 197 responding users on the basis of their experience with 2,015 non-IBM disk drives.

In evaluating the overall performance of their drives, 47% of the users gave non-IBM drives an excellent rating, while 40% rated them as good, 10% as fair and 3% as poor.

Ease of operation brought the highest user praise with a 59% excellent rating, a 36% good figure and a 5% fair rating.

The hardware reliability category showed less user satisfaction. Only 40% of the users rated their gear excellent, while 39% put down good marks, 15% fair and 6% poor.

Maintenance service brought the fewest excellent marks, with only 35% of the users checking that category.

The report compared user ratings of IBM 2314, 3330 and 3330-11 drives and their plug-compatible equivalents. The small sample size used for some vendors' equipment "makes it unwise to draw firm conclusions from the indicated ratings," Datapro cautioned.

Even so, it is apparent IBM 3330 users were pleased with the hardware reliability of the product. For this category, the users gave their IBM drives a 3.8 rating on a scale in which 4 meant excellent, 3 meant good, 2 meant fair and 1 meant poor.

Memorex Corp.'s 3670 users gave that device the best hardware reliability rating among 3330 equivalents with a 3.5 score. Both the IBM and Memorex drives won 3.6 ratings from users in the overall performance category.

Storage Technology Corp.'s (STC) 3335, however, beat both in the ease of operations category with a 4 rating from its users. Memorex 3670 and Telex 6330 users rated their units at 3.6 in ease of operation, while IBM's 3330 trailed with a 3.5.

Maintenance Ratings

The STC gear also led all competitors with the 3.5 rating its users put on maintenance service. IBM's 3330 and Memorex's 3670 both had 3.4 scores, while the Telex 6330 and Control Data Corp. 33301 had a 2.8.

The Datapro report also carried comparative user ratings of the IBM 3330-11 and the competing Memorex 3675.

The four responses from IBM shops that took part in the survey all gave their Model 11s a 4 rating on overall performance. The two Memorex users rated their drives at 3.5.

Both vendors' equipment earned 4 ratings on ease of operation. IBM's equipment kept this same rating on hardware reliability, but the Memorex drives received a 3 rating here. The 3330-11 also led with a 4 for maintenance service, compared with Memorex's 3.5.

The Datapro report included user problem counts on installation and operation difficulties mentioned for each of the IBM and independent drives listed in the report.

Pairing of CPUs Benefits Firm

(Continued from Page 21)

Using this technique, we have effectively provided high-speed output from CP-V to all RJE users of the 168 throughout the corporation. Another 7605 port is assigned to the 360/65 in Weisbaden, allowing CP-V to deliver high-speed output to timesharing users who have RJE terminals in the Motorola European network.

In summary, standard IRBT software allows CP-V to perform in an impressively cost-effective manner within an existing RJE network.

Not Without Problems

The installation and operation of the CP-V slave mode was not without problems, some of which linger on. In most cases, technical problems encountered can be characterized as IRBT mode overtaxing symbiont capabilities.

The next step in establishing a truly corporatewide RJE network involves a major enhancement of IBM's JES2, the successor to Hasp. Under the upcoming Motorola JES network, any RJE user can submit a job to be executed on any host machine (IBM or Xerox) and direct output to any other remote or host.

There are presently no applications which would require channel-to-channel or on-line interface between CP-V and VS.

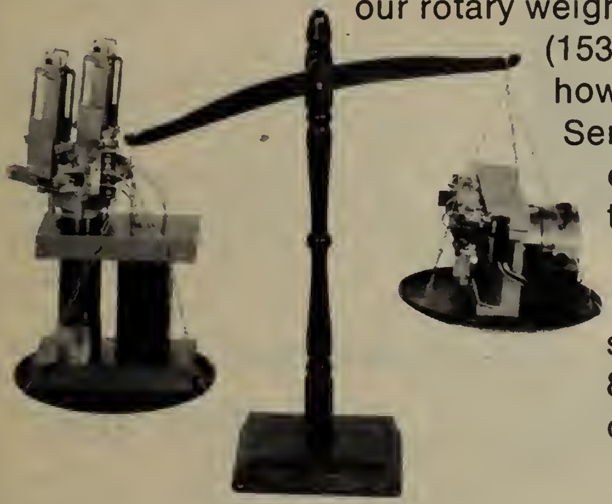
But, for the foreseeable future, the combination of JES network/CP-V slave and CP-V ANS tapes will nicely handle the expected amount and kind of user traffic between systems.

Welch is supervisor of systems programming for Motorola, Inc., Schaumburg, Ill.

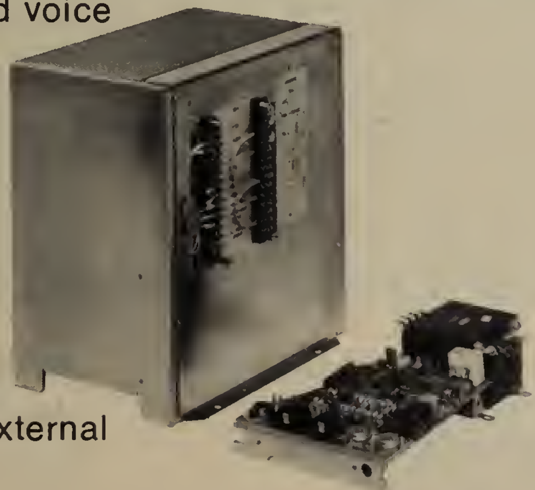
Actuators are the guts of any disc drive. Compare iomec's rotary against the world's voice coils.

Think about what our rotary actuator does for a disc drive. It's the actuator's size, weight, power, position accuracy and reliability that dictate the drive's design parameters. That's why we designed a rotary to replace our old voice coil actuator.

Voice coils can weigh 25 pounds (384 cu.in.), but our rotary weighs 7.5 pounds (153 cu.in.). That's how we got our Series 3000 disc drives down to 65 pounds, including integral power supply, and 8.7″x 19″x 22″ dimensions.



Power? It effects heat, cooling air, user costs, and reliability. Here's a contrast you can't ignore: rotary 40 watts and voice coil 140 watts — steady state. Drive operational comparisons are: rotary drives 150 watts, and voice coil drives up to 600 watts. That explains why some companies need external power supplies.



As you might have guessed, drive manufacturers don't like to be compared to Iomec. It's not just our actuator, but all the Series 3000 features, including: 100-200 tpi, 6-12 Mbyte, front loader, top loader, and dual fixed disc models, all with 90% parts commonality.

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In Switch From 2314-Type Drives

IBM 3330 Equivalents Boost 360/65 Throughput 38%

By a CW Staff Writer

ST. LOUIS – Washington University's Computing Facility recently boosted throughput on its IBM 360/65 by 38% by upgrading its disk storage from IBM 2314-type disk drives to IBM 3330 equivalents.

The University Computing Facility staff felt later-generation disks would bring greater capacity for its research, educational and administrative workload, according to Vernon Kramme, assistant director of the center.

Although IBM would not supply 3330 drives to the 360 shop, Memorex was willing to make the software modifications to allow its 3670 units to work with the 360/65, Kramme said.

The shop previously had 16 California Computer Products (Calcomp) 2314-type units with 29M bytes capacity each.

The 10 Model 3670 modules, each with dual drives of 260M byte/module, give the University Computing Facility more than four times its previous on-line disk storage capacity. In addition, cost per byte of storage has been reduced with the 3670s.

Fewer Pack Changes

"Our older, low-capacity disks required operators to change packs almost on an average of one a minute. With our fully resident system, we change packs approximately once a shift.

"The three-shift facility has reduced its daily operating hours . . . in spite of increased workloads since installing the Memorex disks," Kramme said.

Because of interruptions for disk pack changes and slower access time and data transfer rates, "we were simply I/O bound – too many peripherals in contention for the same channel," he continued.

The average rated access time of the 3670 disk subsystem is 64% faster than the prior 2314-type equipment (27 msec, down from 75 msec); the data transfer rate improvement is 61% (806K byte/sec up from 312K byte/sec).

The plug- and software-compatible disk subsystem requires the use of a standard selector channel attachment. A software simulation, providing IBM 360 and Memorex 3670 compatibility by effectively changing the selector channel to a block multiplexer channel, allows full realization of rotational positional sensing.

This benefit to system throughput, spawned with the current generation of disks, allows the disk control unit and the data channel to disconnect during search time. As a result, the CPU is free for other operations while a read/write head seeks a disk track.

Software support for the selector channel is maintained by Memorex within the OS/MVT Hasp Release 21.7 operating system. Basically, this amounts to inserting Assembler code modifications within the output supervisor of the operating system.

Command retry (automatic error recovery without interruption to host CPU) is provided through both the software modification and as a function of hardware.

"With throughput up by 38%, we can continue an open-door policy to our users instead of limiting the jobs we accept," Robert Benson, director of the University Computing Facility, said.

So far, hardware reliability of the 3670s and maintenance service on them has been excellent, Kramme concluded.

Cyberex SH Inverter Said to Quiet UPS

MENTOR, Ohio – Static uninterruptible power systems (UPS) located in relatively confined areas where people work produce unacceptable noise levels from the inverter section, according to Cyberex, Inc.

The firm says it has a quiet design, designated the SH inverter, in which noise has been suppressed to less than 65 decibels at five feet with ratings up to 75 kVA.

SH inverters are available in 25- and 75 kVA capacities and other sizes on special order. A 75 kVA unit with three-phase output costs about $60,000.

The firm is at 7171 Industrial Park Blvd., 44060.

Teledyne Converter Works With 370s

GARDENA, Calif. – The Teledyne Inet Series 75 kVA solid-state frequency converter for converting 60 Hz power to 400 Hz, 120/208 Vac, three-phase power, is said to be especially useful with IBM 370 systems.

The converter can be located in the computer room. It eliminates the separate 400 Hz power run required when power equipment must be located in a machinery room, the vendor said.

If desired, the frequency converter can be supplied in an uninterruptible power system (UPS) configuration. In this configuration, neither failure nor restoration of the 60 Hz utility power has any effect on the 400 Hz output to the computer.

The Series 75 converters cost between $40,000 and $45,000 from the firm at 711 W. Knox St., 90248.

Binding System Permits Edge-to-Edge Visibility

INDIANAPOLIS – The Planax binding system from Cummins-Allison Corp. is said to allow binding of fanfolded computer printouts for 100% edge-to-edge visibility.

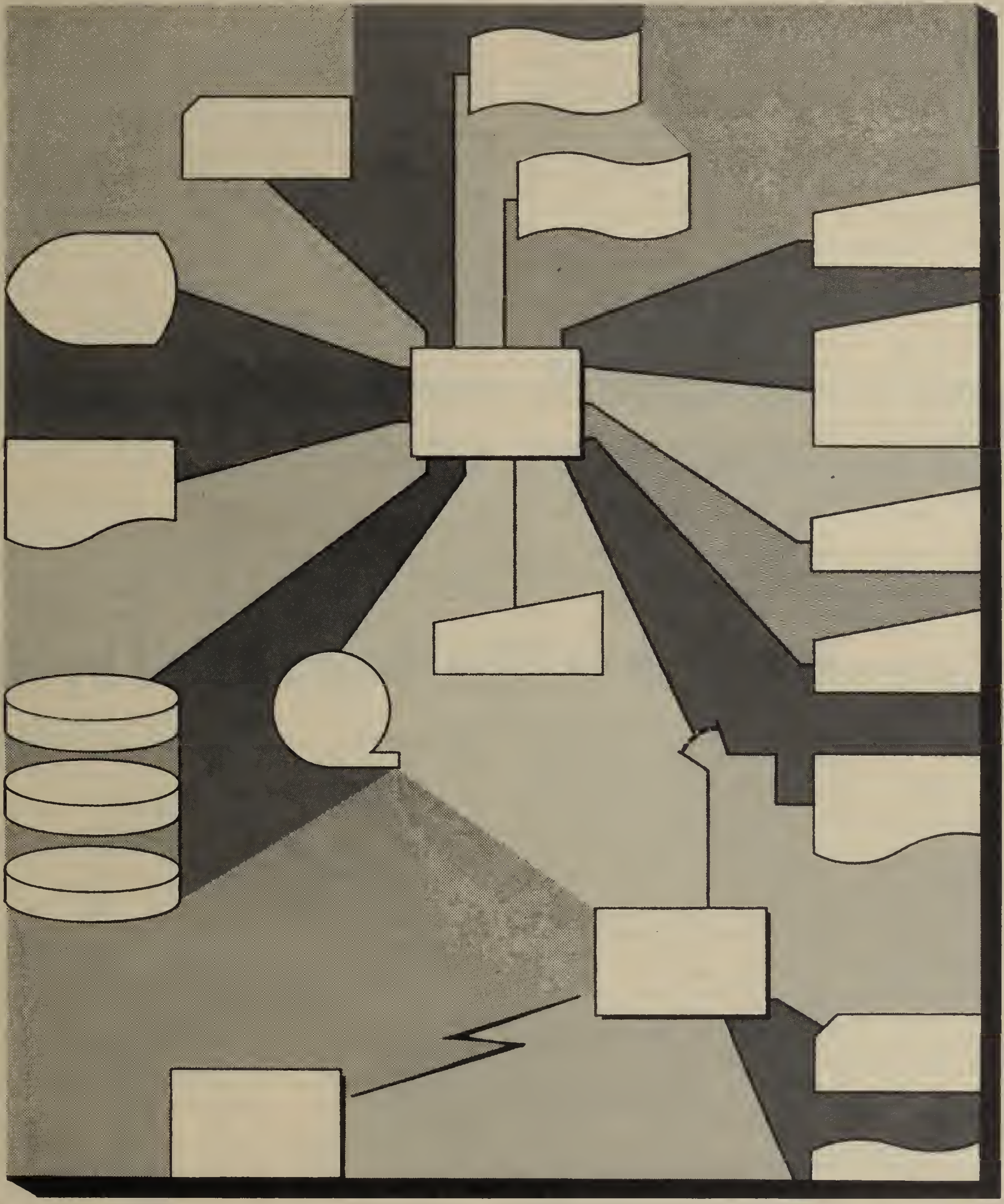
The user clamps the report into a binding rack and then applies a synthetic plastic resin to the spine of materials. After attaching a strip of gauze and applying a second coat of resin, the user places the report, in its clamping bar, under the Planax infrared lamp for three to five minutes of drying.

The Planax binding system costs $600 from the firm at P.O. Box 102, 46206.

MINICOMPUTERS AND SMALL SYSTEMS

A COMPUTERWORLD SPECIAL REPORT

JUNE 25, 1975



INSIDE

This Special Report was prepared under the direction of CW Associate Editor Vic Farmer.

Directions, Applications Unlimited

Use of Minis to Continue to Grow, Change, Adapt

By Daniel J. Tanner
Special to Computerworld

Amorphous. That's the thought. The minicomputers of our times have as many applications and directions in which to go as they have sizes, shapes and definitions.

The range of current minicomputer sizes extends from the LSI and board-level implementations through the intelligent terminals, remote batch terminals and remote job entry terminals.

It gathers in the business, scientific, laboratory and instrumentation minicomputers. It encompasses dedicated minicomputers of all classes from the smallest units running read-only-memory (ROM)-coded routines to the most ambitious front-end systems, data base minisystems and large real-time and timesharing minicomputers; and it culminates in full-fledged, powerful computers with a million or more main storage locations and a stable of peripherals and library of software to match, or at least complement, their capabilities.

But still, the woodwork keeps pouring out "experts" loudly proclaiming the death of minicomputers. They may say the "basic iron" market will be entirely taken over by microprocessors; or that microcomputers will submerge all minicomputers in dedicated applications, and the largest minicomputers available are really "midicomputers" which are doomed to be defeated by the systems offered by the major general-purpose mainframe vendors. Hogwash. Or more assertively, hogwash and wax.

One can't kill a concept by redefining it. The majority of minicomputer manufacturers are in fighting trim, hardened by the tough economic climate and proven by past competitive conflicts. And their genes are plastic.

What's more, the minicomputer manufacturers are even better suited to face the Darwinian economic jungle than are those with merely the ability to evolve. Like nomads, they can readily adapt to new situations.

How Minis Have Adapted

Just look at each adaptation of minicomputers as a trend:

- *The incredible shrinking minis.* These are the products of the progressive compacting of minicomputers, using each new technology when (and sometimes, tragically, before) it becomes economically feasible. Are these microcomputers, or just smaller minis? Doesn't it depend on the source? After all, isn't a Univac 1110 a microcomputer when compared to a Univac I?

But when's the last time anyone called an 1110 a microcomputer or even a minicomputer? Keep this in mind: Many minicomputer vendors have been producing TTL-MSI board-level minicomputers for several years now as their business mainstream, and many of these are now moving into LSI implementations.

What's more, the largest companies in the minicomputer industry all seem to be either buying or setting up LSI capabilities of their own.

- *Kareem Abdul minicomputers.* These are the ones that have grown (figuratively) seven feet tall. While it's clear they'll never take over the entire game, the power and capabilities of these expanded minicomputers are simply impossible to ignore.

They do have, however, two limitations: Too often the manufacturer doesn't have control of the cost of the progressively more powerful peripherals required to make them fulfill their potential; and their software, while quantum leaps ahead of some very recent expectations, still cannot compare in its totality to the established software of the major mainframe vendors.

The makers of these large minicomputer systems are facing those facts squarely, and are making adjustments, ranging from direct showdowns with targeted competitors . . . to the beachhead approach of establishing a niche in the large computer applications spectrum. (This last approach is commonly known as "bridging the gap," an analogy it is hoped will soon pass on due to terminal triteness.)

- *The mini of a thousand faces.* Microprogrammability is a feature not found often enough in the current microcomputers and usually too tightly controlled by those major mainframe vendors whose machines may have the capability.

Some minicomputers have been successful as microprogrammed or microprogrammable machines for a few years now, and most of the mini makers have jumped onto the bandwagon. The capability to microprogram at the user level is now, and will continue to be, a major sustaining feature of many minicomputer lines.

Coping With Changes

Like all manufacturers, the minicomputer vendors will have to face more changes in the future – some very soon, some still quite a way off; some helpful to them, and some that will pose obstacles.

We think they can cope with the changes successfully. To support our belief, we point out that efforts directed against the mini vendors to date have nearly all failed. (As for the companies that have introduced their own minis, their efforts haven't beaten anyone, but rather, they've joined them.)

One change the minicomputer vendors are currently facing up to is that of large-scale integration technology. They are buying it, developing it and/or using it, as they have done with every technology developed in the short history of the minicomputer trade.

TTL, bipolar, PMOS, NMOS, CMOS, Schottky and SOS are all minicomputer buzzwords now, and I^2L, CCD, bubble and even GSI (grand-scale integration, one just coined) probably will soon be.

Software Progressing

Software for minicomputers is progressing on two major fronts. First, the range of sophisticated software tools currently available – especially from the big minicomputer vendors, but also from many of the "iron" vendors – is becoming truly impressive. Many of the major and OEM-only minicomputer vendors have managed to neatly duck the "hand-holding" responsibilities that encumber the major mainframe suppliers by using systems and/or turnkey houses to develop the applications programs for their customers.

And, recently, a third way of carrying the software burden that naturally falls on the shoulders of any large-scale system manufacturer has evolved. That approach has been to carefully target the large mini and its software tools toward a specific application and a specific group of sophisticated end users.

Peripherals are still a question, though. Some analysts state that the distinction between computer vendors and component vendors (considering board-level minis and micros as "commodities") will be decided by the ability to provide peripherals of their own manufacture. How else, these analysts ask, can vendors control costs and the prices to their customers?

They have a point. Now, that is; but "everything passes, everything changes," as Bob Dylan wrote. Technological advances can't be swept under the rug.

The fact is, many of these mini manufacturers are fortunate not to be deeply committed to peripheral manufacture at this time, because the magnetic storage peripheral market may be starting to turn soft.

Disk capacities and transfer rates keep spurting upward, making last year's (or last month's) disk drive and subsystem prices (figured on a cost/bit basis) less and less of a bargain.

Mini manufacturers will be forced to upgrade the data I/O capabilities of their products, no matter whether rotating magnetic storage or some other mass storage technology is to be used. So many of them won't have to scrap an investment to accommodate a new technology, such as charge-coupled devices.

What are users' needs now? A communications front-end? A data base system? A data network? Real-time? Numerical control? A system controller? Does it have to be so big? So small? Solid-state? Ruggedized? Tailored in hardware? Chiseled in stone (ROM)? Chiseled in putty (programmable read-only memory)?

Well, it can be found in today's minicomputer marketplace. Then why should anyone imagine not being able to find tomorrow's products in tomorrow's minicomputer marketplace?

Tanner is managing editor of Datapro Reports on Minicomputers, *a minicomputer industry reference source.*

Research at Ciba-Geigy Aided by HP 3000

FRIBOURG, Switzerland – To the more than 30 scientists of the R&D department of Ciba-Geigy Photochemistry Ltd. here, the recently installed Hewlett-Packard (HP) 3000 minicomputer system has become a valuable research tool.

Photochemistry Ltd. is a subsidiary of Ciba-Geigy Corp. of Basel, a major European manufacturer of photographic copy materials.

To aid in its product research, the HP 3000 was installed in January 1974 and now is used for technical and scientific computations, mathematical modeling and manufacturing process simulations.

One such mathematical model calculates the optimum flow of liquids that become the multiple photosensitive layers of the paper. The strength as well as the direction of kinetic forces created during the drying process of the emulsion are identified and measured.

As a result, variable factors such as emulsion content, timing and process environment may be changed in the computer model to achieve maximum quality and performance.

Another program is used to analyze and study the photo paper during development. Kurt Sager, the company's computer center manager, said, "A mathematical model of this as yet little-understood process helps us to determine what chemical, physical-chemical and physical reactions occur in layers as thin as 2/5000 mm during the commplicated stages of development."

Because any changes in the mathematical models can be studied and evaluated easily on the HP 3000 prior to producing prototypes, costs and long lead times are reduced.

With the computer playing an ever-increasing role in product R&D, it is the department's philosophy that all scientists and chemists write their own programs.

This assures the programs are indeed oriented toward the problems to be solved. The center employs two professional programmers and about 97% of the

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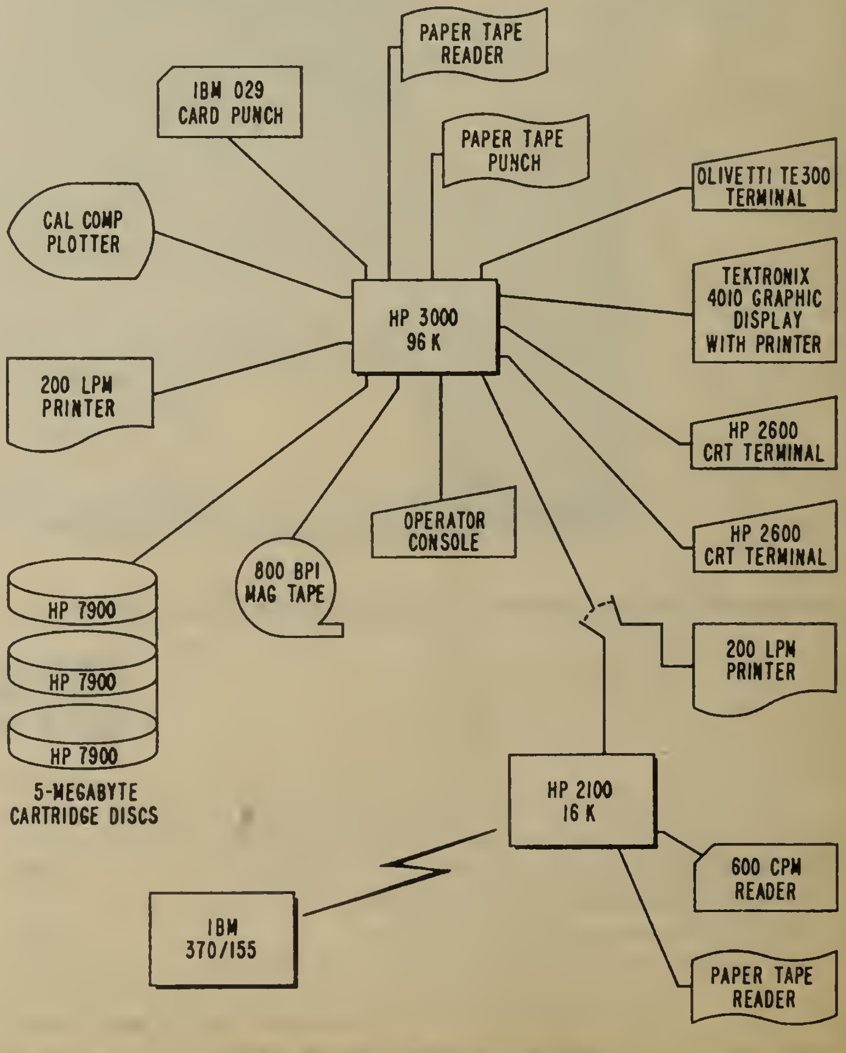


Ciba-Geigy HP 3300 Computing System

HP 3000 Proves Tool of Value For Scientists at Ciba-Geigy

HP 3000 at Ciba-Geigy

(Continued from Page S/2)

center's programs are written in Fortran.

According to Sager, development of all new programs as well as modification of older programs is done directly on the HP 3000. This is faster and less costly than using the corporation's IBM 370/155 computer in Basel via a communications link.

Three Considerations

"There were three major considerations in deciding on the HP 3000," said Sager. "Accessibility, flexibility and future expansion are of foremost importance to our operation."

Restricted to four one-hour blocks of daily computing time on their previous computer, the scientists had to queue up to have their cards processed.

Now, in a typical eight-hour day, up to 30 users chalk up 30 hours of connect time (a multiprogramming factor of about four), two hours of CPU time, 80 time-share sessions, 50 batch jobs and six hours of remote job entry time to the IBM system in Basel.

The system's flexibility permitted incorporation of non-HP peripherals such as an IBM 029 card punch, a California Computer Products plotter, an Olivetti TE 300 terminal and a Tektronix 4010 graphic display with printer.

Ciba-Geigy's complete system includes a 96K central memory, 15M byte of moving-head disk storage, a magnetic-tape unit, two line printers, a plotter, a paper-tape punch, two paper-tape readers, a card reader, a graphics display with printer and four terminals.

A programmable controller (HP 2100A minicomputer with 16K of memory) provides the link to the IBM 370/155. Extensive matrix inversion programs needed to compute variables in some mathematical models are processed on the large-core IBM computer.

Since the programmable controller also allows collection of on-line instrumentation data and extension of peripheral interfacing, real-time data can be available from any HP 3000 terminal for instant analysis. To take advantage of this feature, Ciba-Geigy plans to hardwire two existing HP 2116 disk-operating systems used in the measurement of exposed and developed materials. These process controllers will collect quality control data.

Big Business Demand For Small Systems Expected to Increase

IRVINE, Calif. – A type of computer that was originally designed for use in small businesses will find a major market in a most unlikely place – big businesses, according to A.M. Cosentino, president of Basic/Four Corp.

There are numerous cases where large companies are already incorporating small, simple computers into operations that also include large DP systems. In such instances, the minicomputer is used to perform a specific, routine task – one that doesn't lend itself to the use of a large system.

"We expect to see minicomputers controlling more and more factories, warehouses and offices as well as uncomputerized functions like time clocks, badge readers, process control machinery, quality assurance and other systems that can be automated for a very small expenditure.

"At the same time, the small computer will be used in divisions and branches of large companies in much the same way as it is used in smaller firms: timely and accurate reporting systems, personnel scheduling, inventory and production control and cash flow systems," Cosentino predicted.

He pointed out there are a number of reasons the small business computer will proliferate in big business, but three stand out.

"First is cost," Cosentino explained. "For the work accomplished, a small business computer is considered a steal by many users at an available lease price close to the salary of a junior accountant.

"On the other hand, the cost of implementing software on a large central computer to do the same jobs, with associated communications capability and terminals, can be much higher.

"Second, the small computer does big jobs by relative standards," Cosentino said. "In business systems, modern minicomputers are doing all the tasks done by full-scale machines less than 10 years ago. An industry expert recently pointed out the first Univac machine was considered a giant in its time and was used to run an insurance company; yet it was only the equivalent to a modern minicomputer.

"Third is the matching of the site processing capability of the small business system with communications to a larger central computer." The result is both machines can run more efficiently. The small computer can use the complex programs and extensive files of the central computer for processing at the work site.

Information transferred to the central computer, on the other hand, can be preprocessed, thoroughly checked for accuracy and compacted by the small machine so the costlier operating time of the central system is not wasted on housekeeping and tidying up the data.

User Survey Finds

Better Equipment Ending Problems Found in Past

By Patrick Ward
Of the CW Staff

Better hardware, peripherals and operating systems have removed many of the old problems from minicomputers, users told *Computerworld* in a recent survey.

However, the advent of Cobol or RPG on a mini doesn't guarantee a machine that's easy to use, one said.

People are still the number one problem with minicomputer use, according to Ben Chudnov, director of DP for Melvin Simon and Associates, Inc., a Digital Equipment Corp. PDP-8E user in Indianapolis.

The hardware is available today, he said. The difficulty is to find someone who can put together a configuration that will match a user's needs and leave room for growth.

The minicomputer user can't lean on his salesman for help, he said. While large mainframe salesmen have long been oriented toward the business user, minicomputer salesmen have been used to dealing with people who want to do the job themselves, Chudnov explained.

"You have to find the true professionals who are interested in providing the best service," he said.

Locating this sort of talent, he said, "is like finding a good auto mechanic. I don't know where they exist."

"It's easy to put an ad in the paper for someone with IBM 360/Cobol experience," said Tony Holmes, director of Management Information Systems (MIS) for Bristol Myers Products Canada. "With minis being much more new, it's less easy to get someone with experience in your particular system," he said.

The Right Machine

"Getting the right machine is a problem with minicomputers because there are so many of them," Holmes stated. Additionally, users can be "blinded" by the surface facts of a minicomputer's speed, hardware or that it supports Cobol or RPG.

Any user needs sufficient disk space and memory to do the things he wants to do, Holmes said, but most manufacturers can offer adequate hardware and the user can generally recognize how much is enough, he said.

But the user should also look closely at the more subtle software aspects that can affect the productivity of the system, he said.

"How does it handle the file management, how well does it use that space on disk, how much, if at all, do the programmer and systems designer have to concern themselves with the equivalent of JCL," he asked as examples.

"A lot of people get misled into assuming that as long as [the mini] has Cobol and RPG, they'll be able to use it easily," he said. "It doesn't necessarily follow."

The availability of good utility software, such as an edit program to allow you to manipulate your source programs or the ability to chain jobs together, can be more important for some users, he said.

His firm's Datapoint Corp. 2200s do very well in the file management area, Holmes said. He's also found it easy to train Cobol programmers to work with Datapoint's Data Bus language.

Outgrowing Limitations

Minicomputers are becoming more user-oriented, dependable and are outgrowing the limitations they generally had three or four years ago, the five users generally agreed.

"They didn't have the high-level languages a few years ago and there just wasn't the variety of peripherals," said Jim Hudgings, manager of Computer Services at Bruce Lake Co., Coatesville, Pa.

Mini systems are also becoming less imposing, Hudgings said. He can train an operator for his two Data General Corp. Novas in "about three days."

Today's software allows the mini user to print more professionally and to do commercial editing," according to Charles A. Hunt, assistant vice-president of the National Shawmut Bank of Boston.

Sorting and merging techniques have also improved, and there are now a small group of application program suppliers for his DEC PDP-11s, Hunt said.

A business-oriented user needs a capability for file storage, a range of printing speeds and a variety of input technologies, Chudnov remarked. The minicomputer vendors are recognizing that there is a market here and that they have to prepackage their products to serve it, he said.

Chudnov said he felt the lack of sufficient peripherals from any one vendor had been a problem in the past. Users had to set up a multivendor shop and risked winding up as arbitrators between finger-pointing vendors.

Chudnov said in the future he would have to steer clear of a mixed-vendor minicomputer operation unless it were handling a special-purpose application.

Ideal Minis

Asked to sketch an ideal situation for the minicomputer user that would dispense with a minicomputer's weaknesses and retain its strengths, the users stressed examples based on their own applications.

Hunt wished for more reliability of mechanical equipment. "There's always some piece of gear that's causing a problem," he said. Hudgings would like more off-the-shelf software.

Wes Lenhert, DP manager at Pactra Industries, Upland, Calif., has been using a Basic/Four Corp. system for several years. His only complaint with the system is response times seem a little slow when the three CRT operators make inquiries at once.

If minicomputer prices decrease, Hudgings would like to give his firm's accounting department it's own mini system.

"We would develop software for them and turn it over to them," he said.

He may be aiming at what Chudnov described at Melvin Simon. There, office

(Continued on Page S/5)

Distributed System Saves

TORONTO – Bristol Myers Products Canada has taken a "distributed processing" approach to minicomputer use by putting a system in each of six regional centers across the country.

Previously, the remote sites had mailed in copies of manually created shipping documents for processing at the firm's headquarters here, according to Tony Holmes, the company's director of Management Information Systems (MIS).

Headquarters then produced reports from this data, but they were out-of-date and error-prone, Holmes recalled.

Typically, edit programs running on an IBM 360/30 in the middle of the night would alert the operator that something was wrong with the data, which was already four or five days old, Holmes said.

Sometimes the operator could correct it, in which case people would complain that an operator should not be changing data, Holmes recalled. More often, the data would be bounced back across the continent for correction.

Bristol Myers considered on-line data entry linking the remote offices and headquarters, but line costs would have been high, and it would have called for a large investment in hardware, software and communications talent at the central site, Holmes stated.

Stand-Alone Capabilities

In looking for "dumb, on-line terminals, Bristol Myers noticed the stand-alone capabilities of the Datapoint Corp. 2200 minicomputer system, Holmes said.

The firm decided that by splitting up its customer and product files and by "doing some good systems analysis on them" it could equip local minicomputers with their own set of files.

This would provide a tremendous saving in line costs over the earlier plan, Holmes pointed out.

The six 16K Datapoint 2200s the company installed each have a 2.5M-byte disk and Centronics printer.

A seventh system in Toronto handles communications with the remote systems plus program development work. An eighth unit in Toronto has Datapoint's Datashare software for head office work.

Each of the coast-to-coast regional centers now has its own customer file, its own product file with inventory information and an outstanding-order file. The latter file is backed up on a cassette daily. The other files are backed up in Toronto.

In the daytime, the staff at each remote center keys in data, using alpha names for customers, vendors and products. The alpha names are much easier for people to work with, Holmes said. "They find a customer's name on a minicomputer screen just as they would find someone's name in a phone book."

The fast response times on the dedicated minis' CRTs makes this practical, he said.

At night, the seventh Datapoint 2200 dials the unattended minis, automatically establishes a communications link and collects the day's business from them onto its disks. The Toronto Datapoint then relays this onto an IBM 370/168 at the company's suburban data center.

Update Program

The 168 has been programmed "to decide which minis need to know about what customers and which products," Holmes said. The 168 creates separate records for each mini, as if it were creating a print file, he observed.

The Datapoint then breaks the one file from the 168 into six separate ones and transmits them to the minis.

At the remote sites, update programs "completely rebuild" each mini's files.

"We are able to chain together a number of steps in application programs and Datapoint communications software on an unattended mini running at night to offer the luxury of a fairly extensive update program," Holmes stated.

This results in quick access times for operators the next working day.

The use of distributed minicomputers has not only cut clerical work at the remote centers and substantially replaced a teletypewriter network, but has improved corporate cash flow, provided up-to-date reports and should lead to better inventory control levels, Holmes concluded.

Hardware Purchase Handles College's Total DP Needs

FRANKLIN, Mass. – Although minicomputers are often overlooked when it comes to standard administrative processing, Dean Junior College here found a mini was the best answer to its total DP requirements.

The school followed a traditional hardware path of manual methods, tab equipment and an IBM 360/20 card system with the multifunction card machine.

In 1969-70 it taught the first two-semester sequence of "Introduction to EDP/Business Computer Programming" with the 20, followed by three years of Basic time-sharing as part of a nearby computer consortium.

In 1972, it replaced the Model 20 with a rented NCR Century 50 disk system. The year 1973 was significant, because it received a federal grant toward the purchase of a minicomputer system for Basic student programming.

The 800-full-time-student college was able to justify the purchase solely because of the elimination of the time-sharing costs. A Data General Corp. Nova 840 system with 24K 16-bit words, two 1.2-M-word disk cartridge drives, card reader, console CRT and two teletypewriters was installed in August of 1973.

Dean was caught in a financial squeeze resulting from slightly increasing full-time enrollment and rapidly increasing costs from inflation. But it found the Nova's Fortran IV, especially with the IBM 1130-type Commercial Subroutine Package, could handle the college's administrative needs, too. By purchasing 8K words of additional core memory and a 300 line/min printer, it completed the $55,000 hardware expenditure for the mini system.

Late last year, Dean made the big decision to discontinue the NCR, which had not been adequately meeting the college's dual needs. Thus far, accounts payable, accounts receivable and payroll systems are running well on the Nova.

Hardware downtime has been minimal, with the exception of a faulty line printer which is now fixed. Two local freelancers wrote a translator program to convert 360/20 RPG source programs to Fortran IV source programs.

This means the college can run RPG programs until appropriate disk-oriented systems are designed and constructed. Another small software company also helped Dean with Fortran coding. Dean, at 99 Main St., 02038, is willing to discuss the sale of its software to interested users.

Financial Savings

The financial savings have been directly apparent. "Rather than paying $2,100/mo, which included service, we are paying about $500/mo for the Data General service contract," a college spokesman said.

In addition, the Nova runs on 110 volt, 20-amp wall current instead of the 220 volt, 60-amp circuit required by the Century, and Dean expects to see a drop in its sky-high electricity bill.

"Although we were using the Century inefficiently, with almost all in-house coding in RPG, we now know the minicomputer will give us quicker, more complete and less costly data than the old NCR configuration.

The Basic interpreter is more than sufficient for the students' needs, he added.

The college runs administrative jobs in the morning so the students will have access in the afternoons and evenings.

Problems, Too

But the spokesman did add the Nova has contained its share of unexpected problems as well as unexpected benefits.

The documentation at first was incomplete and lacking in careful examples of the general statements. "Fortran oddities include, for example, random disk files beginning at record number 0.

"Our first version of Basic crashed repeatedly with three users. Not until six months after installation, with considerable help from company application engineers, did a new version of Basic prove itself," the spokesman said.

Once understood, the Real-Time Disk Operating System commands are easy to give and produce reliable results, he added however.

"The Nova is definitely not a turnkey system for the novice user, at least until the documentation improves. Still, the hardware and software will deliver a lot of data for the dollars, and, finally, we are quite pleased with the results," the DP department spokesman said.

Improved Equipment Ending Past Problems

(Continued from Page S/4)

workers "aren't doing data entry; they do the work they would normally do, and the by-product is the information in the computer," Chudnov said.

Melvin Simon, a shopping center development and management firm, uses its PDP-8E for accounting, financial statements, a receivable file and historical files. The company also plans to do operations research on the machine, Chudnov said.

The firm decided on a mini "after making an administrative decision to have our own work done in-house," Chudnov recalled. The firm had previously bought time on a System/3.

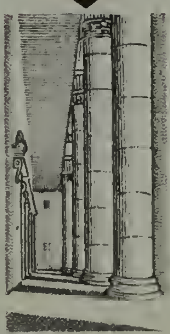
"We found we could justify our own computer, provided it was under the $1,000/mo range," he said. Equipment potential and capacity for growth were important in the choice.

Bruce Lake had also used time-sharing, but got to a point where costs were prohibitive. "We found, for several months' time-sharing costs, we could get a minicomputer that could handle that workload plus several other tasks," Hudgings said.

Charles Hunt at the Shawmut was another time-sharing user. Costs were the key reason for switching this time-sharing load to in-house minicomputers, he said.

A minicomputer replaced unit record equipment at Pactra Industries. The old equipment was functioning up to capacity, and any more applications would have required a second shift, Lenhert recalled.

"We had to pay only $50/mo more for the mini system than for the unit record gear at the time, and the computer opened up avenues to do things we were never able to do in the past," he said.



Study of Development Shows

Midis Challenge Medium-Size Systems

By Jean J. Bartik

Special to Computerworld

It has always been difficult to devise a meaningful, commonly accepted definition for minicomputers, and it is even more trying to come up with such a definition for midicomputers.

Very loosely speaking, midicomputers are, if only by historical development, overgrown minicomputers that have sufficient processing power to move away from dedicated applications and toward more general-purpose processing, yet lack the processing power of medium-scale, general-purpose computers.

Until recently, the midirange was a vast wasteland occupied by such relics as Digital Equipment Corp.'s 18-bit word PDP-15, now called VMS. (DEC never succeeded in stemming the tide toward 16-bit minicomputers and eventually joined it with the PDP-11, but the PDP-15 sold well in large configurations because it had a good real-time operating system and substantial amounts of application software for data acquisition, data base management and laboratory processing.)

HP 3000

In 1971, Hewlett-Packard (HP) announced the HP 3000, which was to be a low-cost super minicomputer for remote-user time-sharing; batch jobs written in Cobol, Basic or Fortran; and some real-time processing.

Although delivered in 1972, software development was delayed and the HP 3000 lost momentum in the marketplace. (It is now succeeding as a medium-sized, time-sharing system.)

Also in 1971, DEC announced the PDP-11/45, which promised to be a midicomputer but was marketed as a high-performance mini because of its software orientation. Modular Computer Systems (Modcomp) introduced the Modcomp IV and Prime Computer came out with the Prime 300 in 1973.

Except for the HP 3000, all these systems really represent an upward extension of the processing power of their respective minicomputer lines that allows them to move away from dedicated applications and toward more general-purpose processing.

During the past six months, almost all the minicomputer manufacturers have either introduced powerful new products or made extensive expansions to existing lines. HP expanded the memory capacity of the HP 21MX to 512K bytes, Systems Engineering Laboratories (SEL) introduced the SEL 32, a powerful 32-bit word system with memory up to 16M bytes, and Varian Data Machines expanded its V70 line to include the V75.

Computer Automation, Inc. even became less obsessed with its titillating Naked and Alpha Mini nomenclature and introduced the really gross Megabyter.

(Continued on Page S/9)

No Stampede to Dispersed Power

Despite the rash of new midicomputers on the market, the movement toward dispersed computer power will not be a headlong rush. The industry will get there, but by the gradual route. The computer industry has grown so big today, radical changes in the modus operandi are impossible. A change of about 10% in almost any direction is probably all the industry can handle.

The minicomputer manufacturers are gradually extending their markets upward by building ever-more-powerful midis, and users are buying the systems. Today's midicomputer processors rival those used in medium-scale, general-purpose systems. Memories are up to and beyond 1M bytes.

Also, the large 3330-type disks are being interfaced to these systems so on-line mass storage can be over 500M bytes. The large memories make it possible to use larger operating systems that can control more diversified processing. The large disks allow a sizable segment of a data base to be stored locally.

Although the software is as yet unavailable, Data General Corp.'s Infos and Digital Equipment Corp.'s IAS indicate it's on the way. It is certain that where the hardware goes, the software is bound to follow.

The advantages inherent in real-time processing over batch processing cannot be denied. Data is available when needed, thus increasing the efficiency of the business operation by providing tighter inventory control, instant credit checks, up-to-the-minute sales figures and current management information.

Except for very large systems, general-purpose computers have been designed for batch processing. The 370/135, for example, could not handle the Lowes Co.'s application in real time [CW, March 26].

Lowes' John Accree emphasized he believes the company's benefits gained by going real-time with each department in control of its own data far outweigh any cost savings realized by using multiple midis. He simply designed a DP system as it should be done, but "it was nice it turned out cheaper to do it that way."

ONLY ALL OF THE ABOVE CAN OFFER ALL OF THE BELOW:

General Automation's new family of low-cost, expandable remote batch terminals offer more capabilities than any competitive systems produced by any terminal or minicomputer manufacturer anywhere.

Here's what we mean by *capabilities:*

Talk to any computer.

Our software emulator packages make our terminals multi-lingual. They can talk to IBM 360/370 HASP or 2780 work stations. They'll also emulate a Control Data User Terminal. Or a UNIVAC 1004 system.

Data spooling included.

Our disk-based emulator packages have data spooling. Which saves you transmission time. Which saves you money.

More operating systems.

Most RBTs have one or two operating systems. Ours have three. Including Free Standing (FSOS), Disk-Based (DBOS) and Real Time (RTOS) operating systems.

Name your configuration.

We can provide any hardware configuration, including any kind of peripheral equipment you could ask for. Our RBT family consists of three basic communications systems (base prices range from $19,500 to $30,000):

RBT-1 is an intelligent batch communications terminal used for entering, transmitting and receiving data between a remote location and a central computer.

RBT-2 combines communications terminal capabilities with a batch-oriented satellite data processing system.

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Holds Inventories, Car Movement Data

Transportation Control System Updates 'Iron Horse'

The freight train thundering across the plains is as much a part of America's heritage as the cowboy. Yet, the men who laid the tracks and rode the first lines would scarcely recognize today's sophisticated freight data networks as being the offshoots of the Iron Horse.

One of the leaders in breaking away from the ingrained traditions is the Missouri Pacific (Mopac) which now controls car, train and terminal operations by computer. An IBM 370/168 in Mopac's St. Louis headquarters holds inventories and car movement data for the entire 12-state region serviced by the railroad.

That computer sends movement data to minicomputer subsystems in Mopac's 22 major freight terminals where the data is processed. The subsystems add car information on demand to support the switching operation.

Mopac's computer network is called Transportation Control System (TCS). The TCS network includes a Yard and Terminal Subsystem (Yats) which ties the basic freight yard operation into the overall system.

Records on File

Every aspect of yard operation is kept on file. Records of every car in the yard and its number are maintained as well as the track and track position, car contents, destination, consignee, switch-handling code, industrial spotting information and applicable codes such as those designating perishable goods.

The car files are organized according to the number of the car. A separate record is kept for each car in the yard and its associated track.

At the yard level, the installation includes CRT terminals in the yardmaster's tower and the yard office. In the office, there is also equipment for high-speed line printing and the reading and punching of data cards. The tower and switching shanties in the yard have "receive only" printers for listing information vital to their functions.

Switching is done routinely by the computer which works from its store of cross-referenced information. The yardmaster is thus free to apply his knowledge of railroading to more demanding jobs. But, should the need arise, he could, through his CRT equipment, countermand a computer order and change switching schedules.

Punched cards used by the Yats system are initiated:

- From waybills in the receiving yard for inbound trains from foreign lines.
- By yard office personnel for trains or groups of trains received from industrial areas.
- Over data transmission lines from the central computer in St. Louis.

All punched cards are entered into the computer as switch engines or trains arrive at the yard. Car and track files thus become a cross-referenced inventory of the yard.

In the Future

Ultimately, the card system will be phased out, according to G.S. Sines, director of the TCS network. Someday, data will travel at high speed from the St. Louis computer to the yard units, while data which originates in the yards will be entered on CRT terminals to be processed by computers.

When that happens, Mopac will be able to use the St. Louis computer to schedule all cars in the system on a coordinated basis.

According to Sines, "The ability to computerize yard operations is a vital part of this bright future picture."

The three types of minicomputers used by Mopac include the Digital Equipment Corp. PDP-11/45, the PDP-11/40 and the PDP-11/10. Each has its own qualities and capabilities and is used accordingly in the Mopac scheme.

The computers contain disk units which store operating programs, communication control software and data files to operate and control freight yards under Yats.

A small- to medium-size terminal with from one to five small yards and an average inventory of 1,000 to 2,000 cars would be provided with a PDP-11/40. The DEC PDP-11/40 has 4K, 16-bit words of memory and on-line disk storage capacity of 7.5 million characters on three disk drives.

A larger terminal with several freight yards and an average 2,000 to 8,000 car inventory would have a PDP-11/45 as the principal minicomputer with a PDP-11/40 for backup needs. The combination gives that freight terminal a total of three 40-million character disks with from 80,000 to 90,000 16-bit words of memory.

(Continued on Page S/12)

Distributed Approach Ups Capabilities...

ROHNERT PARK, Calif. – The State of California plans to utilize a minicomputer to draft new legislation and maintain state codes.

The computer will be installed in the offices of the Legislative Council, an arm of the California State Legislature that performs legal research and assists in developing preliminary versions of new laws.

The function of the Varian V72 will be to expand the capabilities of the overall DP center by allowing the remote mini to relieve an IBM 370 of processing tasks.

By permitting use of non-370-compatible terminals, utilization can be made of the special characteristics of certain terminals.

This configuration supplements the Teale Data Processing Center without disruption or change of the existing IBM Customer Information Control System (CICS) and other teleprocessing programs.

However, the nature of the system is changed from a centralized one to a distributed processing system.

The V72 with an 80K core memory will

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Midi Development Challenging Medium-Scale Systems

(Continued from Page S/6)

Three major minicomputer manufacturers introduced powerful new products: Data General's Eclipse, Dec's PDP-11/70 and Interdata's 8/32 Megamini. The Eclipse and the PDP-11/70 are 16-bit word computers while the 8/32 Megamini is a 32-bit machine.

In a way, each can be considered the top model of its manufacturer's line of minicomputers; but all overlap the processing power of medium-scale, general-purpose machines.

These midis differ from true general-purpose systems in two ways: they are oriented toward real-time rather than batch processing, and their software offerings include systems but not applications software.

Owing to substantial processing power, these systems need not be dedicated to single applications. Because of low prices, they can be justified for doing only part of a company's DP. Thus, these systems have the unique status of being midway between a minicomputer that is devoted to a single application and the general-purpose computer that typically carries a company's full DP load.

The Tramp as Challenger

When Interdata introduced the 8/32 Megamini, the company boldly compared it to the Xerox 550 and IBM System/370 Model 158 as well as the Eclipse and the PDP-11/70.

On the surface, the comparison of the 8/32 Megamini with the 370/158 appears ludicrous except for instruction execution times. The software and system support for the 370/158 may make the 8/32 look like a tramp in comparison with Charlie Chaplin.

The real tramp's world is circumscribed, but he may be as strong as Sir Charlie and he travels light. Chaplin can travel with the rich and mighty of the world, but he can only pretend to be a tramp; he requires an entourage and many trappings to survive.

True, the 8/32 Megamini has no applications software; but, with 128K bytes of memory, it costs about $51,900, whereas the minimum Model 158 requires 512K bytes of memory and costs $1,779,200.

Despite the lack of application software, the Megamini, PDP-11/70 and Eclipse must be considered serious challengers to the growth of the medium-scale, general-purpose computer market, especially as networking gains momentum in dispersing computer power.

First of all, the price of these midicomputers is less than one tenth that of the 370/158. The use of multiple midis in a system is economically practical.

Second, these midis sprang from the real-time, on-line world of minicomputers, a world commercial processing knows only through data entry via small business computers or terminals. The operating systems for midis were designed for foreground real-time processing with background batch processing.

Third, LSI technology and packaging techniques allow systems to operate reliably in an ordinary office environment. Downtime is minimal and maintenance consists of little more than replacing an occasional circuit board.

Fourth, these three midicomputer manufacturers are major companies with proven management stability and service records. They have survived in a highly competitive market that has shaken out the weak.

Fifth, the minicomputer user's philosophy of buying only the computer power needed to do a job fits in with current management attitudes toward DP budgets. The systems are highly modular and can be configured with little excess power yet can be easily field upgraded.

The Growth of Minis

The minicomputer first gained popularity because small computer users found large batch-processing computer centers did not have the flexibility and responsiveness of a small computer. Users were unimpressed with total throughput if a particular job had a 24- or 36-hour turnaround, especially when a minicomputer costing less than $20,000 could do the job and, in many instances, do it interactively for immediate response.

Increasingly, minicomputers have been used at remote sites to handle local processing, communicating with a central site only for data entry to, or response from, a master data base. The use of a midicomputer to handle specific applications in dispersed processing networks is merely an extension of that principle. The midicomputers are three, four or more times as powerful as the top-of-the-line minis; thus, they can handle more tasks and more complex tasks.

PDP-11/70 is upward-compatible with the rest of the PDP-11 line. It can operate under Commercial Time-Sharing System/Extended (CTS/E) and handle up to 63 on-line Basic Plus users operating in the foreground simultaneously with one batch Cobol background job.

A configuration that includes the PDP-11/70 computer with 192,000 bytes of core memory, magnetic tape drive (1,600 bit/sec), disk storage (88 million bytes), printer (300 line/min), and 10 on-line terminals will rent for $5,700/mo

(Continued on Page S/11)

...To Help Council Draft Legislation

(Continued from Page S/8)

be a key ingredient in the system to be developed by Prodata International Corp.

The distributed processing-type system will consist of the Varian processor, a 200M byte disk storage system, two line printers, a backup tape drive and two multiplexing units which support communications lines with several System/370s and with 18 display/hard-copy terminals.

The 370 CPUs are located at the Stephen T. Teale Data Center in Sacramento, while the terminals – 16 to be IBM 3270-compatible and two non-compatible – will be utilized by that many operators in the offices of the council.

The system will allow users to retrieve bills in progress and those already law and use them when drafting revised versions or related new laws.

In addition, it will be used to maintain state penal, health and motor vehicle codes. The stored memory will contain the entire California jurisprudence. A text retrieval and editing program will be part of the system's capability.

Food Storage Firm Levels Mountain Of Paperwork With Automated System

Since installing the GA 18/30 automated warehouse system, Ray Pschirer has cut his paper-processing time by at least 25%.

KANSAS CITY, Mo. – If Stone Age man were to return to central North America today, he might find it difficult to comprehend that someone actually has computerized his caves . . . and with a minicomputer.

Space Center, Inc., based in St. Paul, Minn., operates six warehouse centers around the country as well as a facilities division, distribution operations, a trucking and hauling division and a financial services division.

Its warehouse here has 1.2 million sq ft of net usable storage space, including six acres of freezer space. The primary service offered in these caves is the storage of foodstuffs, since year-round temperatures range from 65- to 70 degrees and humidity can be maintained easily at 45% to 50%. The computer system keeps track of it all.

"Our average weekly in/out volume is around 15 million pounds, which is handled in 300 trucks per week and 600 to 700 railroad freight cars each month," said Ray Pschirer, operations manager. "This means a mountain of paperwork in the form of invoices, receipts, bills of lading, customer account records and inventory control records."

The size of the paperwork load is the reason Pschirer and Earl Ryan, vice-president and general manager, have installed an automated warehouse system from General Automation, Inc. (GA).

The computer system consists of an 18/30 central processor with 8K words of core memory, three 512K-word disk drives, a 300 line/min printer, one console, one remote teletypewriter and a GE Terminet T300 for forms output.

System software is all Macro Assembler, and application programs are basically text editing and file management routines that provide a data base custom-designed for public warehousing. It includes a fully buffered, multiterminal operating system.

It isn't a time-sharing system because the processor works on only one task at a time, but, because of the speed with which it completes each task (usually one to two seconds), the user at the terminal never sees any delay at all.

"We've cut our clerical time by at least 25% using the computer system, and we now only use two people to do that workload," Pschirer said.

As each customer shipment arrives at the Space Center warehouse, all information on it is entered into the computer via a combination bill of lading and warehouse receipt input form, typed in by one of the clerk/secretaries.

This includes customer identification number; the date of the receipt; customer name and address; the route to be used for shipment; freight bill number; rail car or truck identification and seal number; customer reference number; and, finally, all data on the warehouse item and lot numbers, quantities and shipment weights.

"This information forms the data base from which all succeeding transactions are handled by the computer," Pschirer explained. "Our inventory is tracked automatically and updated as new shipments arrive or as products are distributed from here.

Kathy Toomay is one of two people who enter all incoming shipment information into the computer, forming the data base on which all succeeding transactions are based.

Midis Offering Challenge to Medium-Scale Systems

(Continued from Page S/9)

on a five-year lease plan. DEC supplies high-speed, fixed-head swapping disks, disk cartridges and up to 700 million bytes of on-line mass storage for the PDP-11/70. Memory for the system can be 2 million bytes maximum.

Once the Interactive Application System (IAS) is delivered, the PDP-11/70 can operate interactively with multiple users, developing or executing Basic, Fortran Plus, Cobol or Macro assembler programs; all users can be performing different functions.

A number of customers implementing networks using various PDP-11 models are looking at using the PDP-11/70 in a dispersed processing system.

A major midwestern railroad is implementing a network that ties 80 terminal points and 24 railroad yards to a central site. This user feels the current network, which is being implemented using PDP-11/40, 11/45 and 11/50 processors to manage the railroad yards, does not require more local processing power; but, if new applications are put on-line, the company will upgrade to the 11/70.

A Study in Classics

The user dispersed computer power for two classical reasons: to minimize the high cost of communications involved in doing all processing at the central sites and to prevent disruption of railroad operations in the event of power failure at the central site.

Data General's venture into the commercial market is with the Eclipse C/300 operating under Infos file management system. The C/300 is targeted for multiterminal, on-line, keyed access to data bases for transaction processing and generating periodic, exception and demand reports from that active data base for management control.

A medium system that includes the C/300 processor with 128K bytes of core memory, 90 megabytes of disk storage, two displays, magnetic tape drive, line printer and an eight-line asynchronous multiplexer costs $113,950. Major markets for the C/300 are departments of large corporations and organizations now sharing large, general-purpose computers.

An early Eclipse user is Lowes Co., a building materials and supplies firm with 129 stores in the midatlantic and southeastern U.S. Lowes is implementing a dispersed processing system using eight Eclipse C/300s, which will replace the currently used IBM 370/135 in the fall of 1976.

According to John Accree, DP manager, the system follows his basic philosophy of DP. He believes the people who do the work in a department should have complete access to and control over the data of that department.

Thus, the DP department's function is to supply processing capability at the point where the work is done and at the time work is done. The only way to do this is on a dispersed processing, real-time basis.

Once conceptualized and designed, the system cost was estimated using different implementations. The estimated cost for a system using multiple Eclipse computers was one-third that of a system using a large IBM System/370 with as much independent equipment as possible, and one-fifth that of an all-IBM system.

The total Lowes system will take about 18 months to implement from the time of conception. Installation of 129 Data General Nova 1200s, one per store, took 5.5 months instead of "forever" as some skeptics suggested.

Accree believes programming was actually simplified because Data General supplies no applications software, only systems software, so no time was wasted fixing up general-purpose applications packages.

Tool Makers

Interdata, like other midicomputer manufacturers, concerns itself more with making tools for others to use in solving problems than with solving the problems directly. Initial markets for the 8/32 Megamini have been in aerospace simulations, but Interdata has a real-time multitasking system for multiterminal program development via Fortran V, Basic and Macro Cal.

The Megamini supports up to one million bytes of memory, tape cassettes, magnetic tape, disk cartridges and 40-megabyte disk systems. An 8/32 configuration that costs only $56,300 can function very well in a computer network for dispersed computer.

One company is developing a pilot flight trainer using three 8/32 Megaminis; two operate in a multiprocessor environment to perform the flight calculations, and the third provides the tactical environment. An Interdata 7/32 is the fourth computer in the system, used for radar landmass digital simulation. An IBM computer is the on-board computer.

Based on past experience, this company ruled out a big, general-purpose computer because

(Continued on Page S/12)

data processing needs: **Datapoint's New, Expanded Datashare System**

- ■ *Datapoint 5500 Central Processor/Mass Storage Disk Units*
- ■ *Datapoint 3600 Remote Terminal/Hardcopy Terminal Printers*
- ■ *Datashare III*

The new Datashare system, from Datapoint, builds on the success of the initial Datashare based on the Datapoint 2200 processor. The concept remains the same — a compact central computer with associated peripherals providing the people who need it most compute power at remote work stations for a variety of business data entry and processing needs — but capacity for work throughput and diversity of applications have expanded greatly with the new version. For businesses whose workload has outgrown both available equipment and available budget, Datashare represents a real breakthrough. Nowhere else can you get such a total business data processing capability at such a modest cost. Let's take a closer look at these new elements and what they can do for you.

The Datapoint 5500 — a compact but powerful business processor that incorporates the very latest integrated circuit technology. Physically the same size as the Datapoint 2200 and 1100, the 5500 offers 64K high-speed internal memory and an advanced processor architecture with a wide variety of printers, tape units and disk systems (see list). It can supply up to 16 work stations simultaneously with compute power. In one typewriter-sized unit the 5500 provides the basis for an independent "computer utility" operation (even while it serves optionally as a highly efficient data communications link to a central computer complex.) Fully compatible with software created for the Datapoint 1100 and 2200 systems.

The Datapoint 3600 — a low-cost video terminal with upper case/lower case capability, a unit designed for efficient satellite use with a Datashare configuration. (Datashare also works efficiently with other Datapoint units such as the 1100 and 2200 and all TTY-compatible terminals.) The optional 120 CPS belt printer serves as a hard copy outlet for work stations where printer information is desirable.

Datashare III — the enhanced master control system that extends Datashare capability to 16 remote stations, allows users at these stations access to the expanded number of peripheral units that may be associated with the 5500. Version III offers greatly improved file creation and handling capability, including advanced file protection/security and virtual memory techniques.

Additional Datashare components have been added but the Datashare philosophy remains the same — to provide the business user a low-cost, highly productive way to disperse a powerful data entry and data processing capability among departments and field offices. Either as an independent system or as part of a larger computer/communications network, the new, expanded Datashare is available now to help your organization. For further information contact the Datapoint sales office nearest you or write or call Datapoint Corporation, attention: Marketing Department, 9725 Datapoint Drive, San Antonio, Texas 78284 (512) 690-7151.

The new Datashare — supporting up to 16 remote work stations

Each remote unit may be equipped with a printer unit for hard copy capability.

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Construction Firm's Small System Handles Many Tasks

TORONTO – A small computer may not wear a hard hat, but it certainly is handling more than its share of the workload and saving thousands of dollars a month for a Canadian construction firm.

Since installing the equipment, the Dineen Group here has found the system is saving two months work at the end of the year alone.

"Prior to installing a minicomputer, we had to hire three extra employees at year end just to balance out and take care of income tax records," explained David M. Fleming, vice-president of finance for the Dineen Group.

"In addition, all the cost reports were completed by hand and the payroll done manually. This required an average of two clerks for every eight construction jobs.

"Moreover, keeping track of details on a single construction job means hundreds of separate ledger cards," explained Fleming.

"Now, instead of searching through mounds of cards for a piece of information, we instantaneously call up the data on the display screen of the computer or ask the system for a printout."

Over the years, the Dineen Group had developed a good reporting system for their various projects, but the more the work expanded, the more the accounting slowed down. After studying the various systems available on the market, their evaluation concluded that a Basic/Four Corp. minicomputer was the unit best suited to their needs.

"We didn't want to change our system," said Fleming, "but we did want to speed it up by eliminating much of the time-consuming manual work. The computer was programmed to accommodate us – we didn't have to change our system at all."

At the time the system was installed, there were about 30 major construction jobs in progress. It took about 20 days to switch over to the system.

The Dineen Group, which does around $35 million a year in business, mainly in construction, is comprised of a wide variety of companies with branch offices in Hamilton, Ont.; Winnipeg, Man.; Halifax, N.S.; and St. John, N.B.

"Our problem arose when it came to processing the accounting information from all the growing operations," Fleming pointed out. "But the minicomputer has simplified that greatly."

Saves Time

Cost reports for about 20 jobs are produced on the system in around eight hours; whereas it used to take many clerks a great deal of time to do this manually.

The accounts payable operation processes around 4,000 invoices a month in about 60 hours. The payroll for about 300 workers is processed once a week and takes about 1-/2 days to complete.

Also produced on the system is a weekly labor and cost report for the firm's project supervisors. Each report details exactly what was done on a job and what it costs that week; this is compared with the original estimate, enabling the supervisors to see exactly where they stand on a weekly basis.

In addition to the job cost reports, accounts payable and payroll, the system also handles accounts receivable and the general ledger.

Another convenient function handled by the minicomputer is equipment reporting. "With our large inventory, it's helpful to know where everything is, what revenue it's recovering or whether it's time for a trade-in. With over 800 items valued at $2.5 million, the system is able to provide a vast quantity of schedules and capital cost and insurance reports," Fleming said.

Midis Challenging Medium-Size Systems

(Continued from Page S/11)

of cost overhead in the operating system, physical size and power requirements. For the kind of number crunching and the kind of input/output required by the application, the 8/32 Megamini equals the performance of an IBM 370/158.

The Megamini does require extra work to develop applications and communications software, but these are one-time jobs. A company spokesman pointed out minicomputer manufacturers are so accustomed to interfacing their products to nonstandard I/O devices, they have developed "standard" ways of doing so. The operating systems are relatively simple real-time systems; they allow direct access to services if time constraints require it. The slow I/O for this system is to disks, and high-speed I/O is to analog-to-digital and digital-to-analog converters and digital devices. Price/performance of the Megamini played a big part in its selection.

Bartik is project editor at Auerbach, Computer Technology Reports. The material presented here was drawn in part from Auerbach Minicomputer Reports, *a service offering analysis of almost 200 small business computers, intelligent terminals and minicomputers.*

Transportation Net Updates 'Iron Horse'

(Continued from Page S/8)

The third minicomputer type, the PDP-11/10, would be used to link a remote freight yard to a terminal equipped with the PDP-11/45 and the PDP-11/40 combination. The PDP-11/10 has 16K words of memory and communicates directly with the prime system as well as supporting local peripherals.

Yats justified its existence even in the initial stages by creating additional revenue for Mopac and better service for the shippers. Improvements spawned by the system have outweighed the cost of computerizing car information at freight yard levels.

Further, the system meshed so well with existing Mopac routine that personnel in yard offices needed only nine hours of special training to adapt to Yats. That single quality of the system was very important to Mopac. As Sines put it: "Freight yards are run by railroad men, not computer technicians."

If problems should arise in computers at local levels, technicians patch in from St. Louis and make their diagnoses. "With this approach," Sines said, "computers are a tool for the railroad and not vice versa."

With Some Reservations

Vendors Express Respect, Faint Praise for System/32

By Patrick Ward
Of the CW Staff

"Small business systems are coming into vogue in 1975 because they've come down to a price the small business user can afford," according to David Clinton, director of marketing for Boone Custom Systems, a systems house in Minneapolis.

In that case, where does IBM's entry, the System/32, fit into this scheme of things? Other vendors in the minicomputer field have both respect and faint praise for the IBM system, a *Computerworld* survey found.

The System/32 "is a high-powered microcomputer system with peripherals and dedicated applications packages. The proliferation of that (concept) will be tremendous," said Pat Kane, president of Applied Data Communications, Santa Ana, Calif.

However, Frank McPherson, vice-president of marketing at Decision Data, Horsham, Pa., does not see the System/32 as the answer to users' hopes.

In 1969, IBM came out with the System/3 at $990/mo with software, he said. Five-and-a-half years later, the S/32 made its debut at $849/mo – not much less. It is not low-priced enough to compete with other offerings in the field, McPherson said.

Ideally, users in small reporting units, the small federal or state branch office and other sites will want a small business system that is "simplicity all the way through – in programming, operations" and ease of understanding generally, he said.

"When the system has problems, the operator should not have to reinvent the wheel to get it up and running again," he stressed.

The turnkey software or off-the-shelf application package should "be in an easy language the world knows" and be easily modifiable.

The world is not static: if the user firm decides to open a branch in Massachusetts, it would be able to easily plug in the software to handle that state's income tax, he said.

The users who run the system "want to be able to do this themselves," he remarked.

'Very Well Done'

While McPherson has reservations about the S/32, Daniel Clinton described it as "very well done, very well thought out and the price is right."

"The amount of software available on the machine is tough for the competition," he added.

"Because IBM is IBM, I think there will be a lot of customers who will take the System/32 as it is and work around it," he remarked.

Applications Apropos

"I don't necessarily feel System/32 is all things to all people yet," said Donald L. Schnitter, director of marketing services for Basic/Four Corp. of Santa Ana, Calif.

Nevertheless, "the applications they're selling . . . are certainly apropos," he remarked.

The System/32 suits "the novice user who wants to buy IBM" in the view of Saul Newman, president of Applied Digital Technology, Inc., a Chicago minicomputer systems house.

Even IBM can't afford to be all things to all men in the software it supplies for the S/32, Newman said.

Economics will dictate that, when a systems house writes a very important piece of software for one important customer, that (industry) will become its specialty and eventually nobody will be able to compete with its expertise in that area, he said.

This need for specialization will cause systems houses to carve out a little niche through a record of solid performance in an industry, he said. This will lead individual systems firms to become "king of the meatpackers in DP business or the IBM of the film libraries or the insurance agencies," he predicted.

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DM-9200
A double-density version of the DM-9100 with double the capacity, this drive gives you 200 megabytes of storage. Use an IBM 3336 Model 11 (or equivalent) disk pack for a full 808 cylinders plus 7 alternates. Each track has a capacity of 13,030 bytes, and there are 15,352 tracks per pack.

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No matter which of these four new Ampex disk drives you have in your system, you can employ a single, family-compatible interface. Plug the Ampex disk model of your choice in or out of your system without worrying about new control electronics.

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Small Business Becoming Prime Target of DP Industry

By B.V. O'Brien

Special to Computerworld.

With a few exceptions, small business has been bypassed by most of the computer industry. Until about 1970, only the batch service bureaus and the manufacturers of forms and accounting machines paid much attention to the small businessman.

Now, thanks to major changes in technology, industry structure and, most importantly, marketing, this situation is changed.

The two factors that have limited the use of computers in small businesses in the past have been technology and marketing. The development of computer technology prior to 1970 was directed almost exclusively at the large companies (and government agencies) and their applications. Most hardware advances such as mass storage devices as well as software advances such as operating systems have been applied to the medium-to-large application.

Even minicomputer developments have been oriented to the special applications (laboratory, communications, process control) of the large organizations. Development effort was directed toward improvement in cost/performance rather than just cost reduction.

The basic thrust of the industry was "scale factor" – obtain further economies by ever-larger scale of operation. The solution to all problems was a bigger computer.

But, in the early '70s, the large users themselves started to rebel. The cost and complexity of their computer systems were becoming too great to manage. Users started to buy more carefully and manage more closely.

As a result, the computer industry found itself dealing with a relatively static number of large companies whose internal growth, now being carefully managed, was much smaller than in the "swinging sixties." The industry needed new customers – and the small businessman was the obvious choice.

The initial efforts to penetrate the small business market were largely technological adaptations of the things that had worked for large companies. Application programs for automobile dealers and medical labs were attached to standard timesharing packages. Dozens of "system" houses were founded to apply minicomputers to the problems of small business. The pioneers were on the move again. It wasn't very good, but it was all there was, and much of it succeeded.

And what success these initial efforts had was frequently achieved without the benefit of a solid, coordinated marketing effort. It was the success of hardware and services sales to those customers who could (or thought they could) support themselves or to those customers who were lucky enough to be dealing with the thoughtful entrepreneurs who could relate the product to the customers' real needs.

New Generation of Products

Within the last couple of years, a new generation of products for the small businessman has started to appear. The most notable is the IBM System/32, but there are also intelligent terminals with practical levels of software and maintenance support, peripheral devices for minicomputers and, most significantly, industry-oriented information service offerings.

These developments are not simply new products. They are increasingly complete end-user packages, offered by organizations with an understanding of the customer needs, the resources to support the product and commitment to the small business market.

The major characteristic of these developments is they are oriented around the needs of the small business, which are unique and different from those of big business.

Emerging Patterns

Enough of these developments have been introduced recently that some clear patterns for the future are beginning to emerge.

For the small businessman, the vendor will become more of a composite vendor or an assembler of talent.

Behind this end-user supplier there is developing an array of "wholesalers" of computer processing, special products, software and all of the other components required for the small business application.

Problems Remain

Many problems unique to the small businessman's DP applications remain to be solved. The major ones are data entry, data transmission and data base inquiry.

Data entry for the small businessman is an even greater problem than in a large company. The data entry in a large company is a big enough task that it can be capital-intensified with on-line equipment such as the IBM 3270 or with various types of keypunch or key-to-disk equipment. It can also be somewhat centralized, organized, staffed with trained, full-time personnel and, in particular, supervised.

In the small business location, a different environment prevails. The ability to put in special data entry equipment is severely limited by the amount of money the small businessman can spend.

At the same time, the data entry operator or operators are nearly always part-time individuals with little or no access to a supervisor familiar with the data entry process.

Various solutions have been used with varying degrees of success. Operator prompting tapes (paper and magnetic) have been used extensively but these cannot perform any error control.

Intelligent terminals have been used, but these become prohibitively expensive for all but the largest of these small business firms. Optical character recognition and similar techniques are still far out of the price range.

Data Transmission

Data transmission is another area where the fruits of technology have largely bypassed the small businessman. The combination of his typically low data volumes (10,000- to 100,000 char./day) and his remoteness from the computer center puts him in a position where dial-up is the only practical alternative.

This and his economic situation largely precludes the use of the newer technologies of high-speed transmission, efficient line protocols like Synchronous Data Link Control (SDLC) and other tech-

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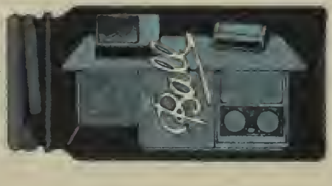

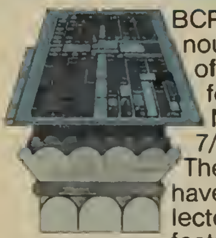

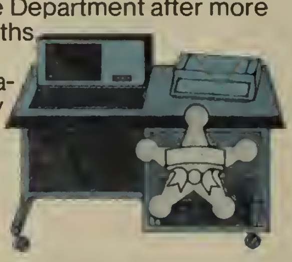

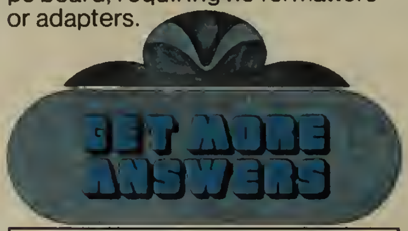

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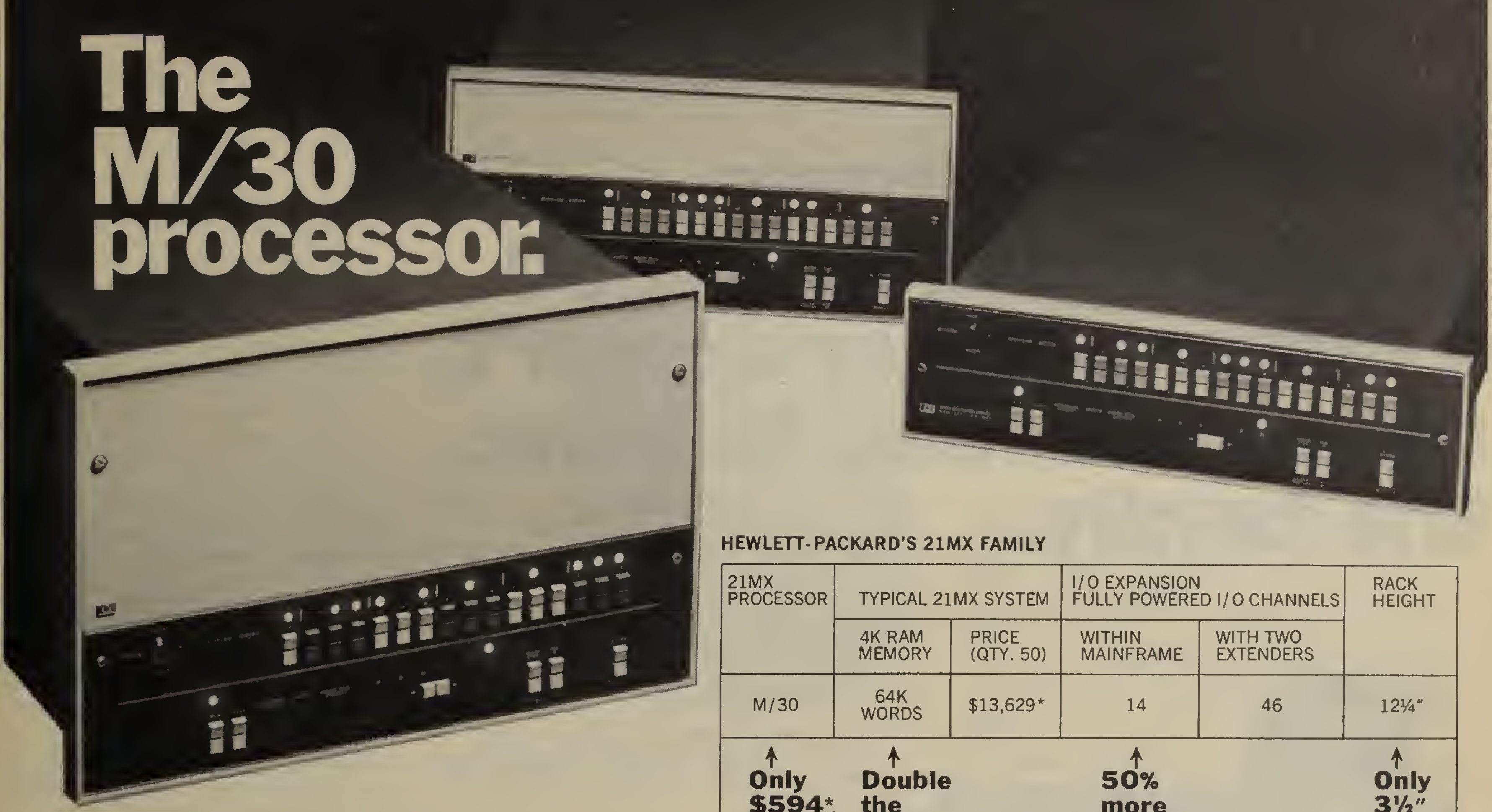

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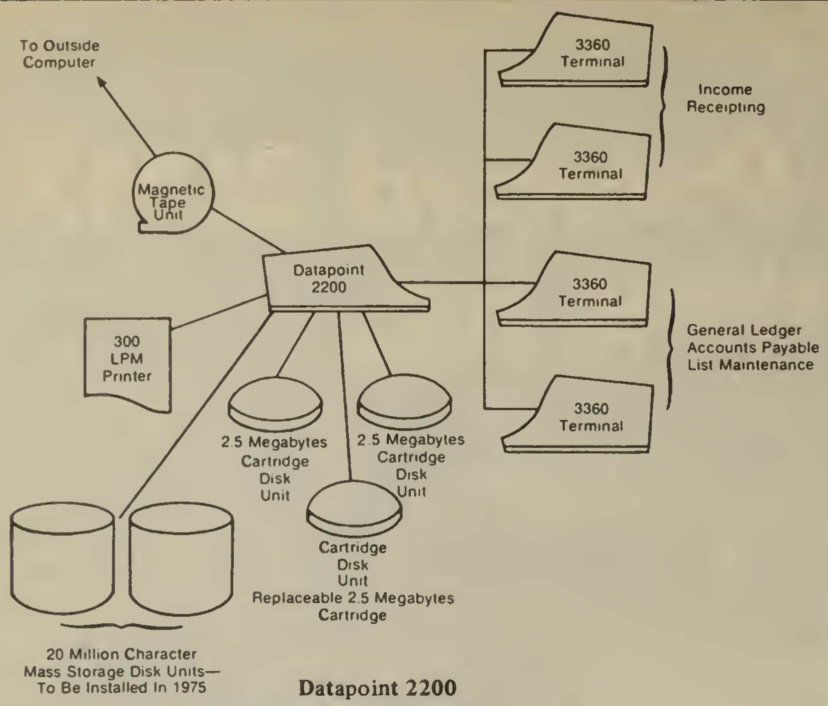

Datapoint 2200

Medical Center System Reduces Costs, Eliminates Input Error

LOS ANGELES – City of Hope National Medical Center, a medical research and treatment facility uses a mini-based system for total business DP requirements in its national headquarters.

Benefits include sharply reduced administrative costs and elimination of data input errors, according to administrative officials.

In the City of Hope Datashare system, a Datapoint 2200 central processor provides compute power to four on-site CRT display terminals for both data entry and DP applications.

Operators at these low-cost, "nonintelligent" terminals have access to the processing power of the 16K 2200 and the storage capacity of the four cartridge disk units, each of which can hold 2.4M characters on replaceable cartridges.

Plans are to upgrade the the recently introduced Datapoint 5500 CPU which can provide up to 16 work terminals with compute power.

The system, in use since the first of the year, brings computer power to bear on many activities in data handling that previously involved three or four separate work processes.

Costs Cut Sharply

The system has enabled hospital management to tie closely together data entry and DP activities, cutting clerical costs sharply from the previous system employed and delivering a much more accurate finished product.

"The initial entry of data from a source document – for example, a check sent in by a contributor – is used over and over again for multiple applications throughout our accounting system," said Kenneth Pierce, director of systems design.

"With the programmed error checks built into the system and the special formats or "masks" for data entry, which operators can display on the screen and visually scan, we can be sure the data we enter is correct the first time. That's our building block. On that, we structure the rest of our accounting edifice."

Primary applications at the installation currently include income accounting from contributors and other sources, accounts payable and general ledger accounting for 12 separate entities within City of Hope.

Also, the coordinated data entry/data processing characteristics of the system allow its use for update chores on City of Hope's 300,000-name master contributor file.

City of Hope has developed over 100 special application programs and routines for use with the system. These programs are kept on disk storage and can be called up for on-line use by any of the operators at the video display units through keyboard selections.

Many of these programs will cause display of various formats, or "masks," on the CRT screens for various data entry applications to allow faster, more accurate input of data from source documents.

The programs developed will be made available to other hospitals and fund-raising institutions with comparable administrative requirements, according to Pierce.

Industry Targeting On Small Business

(Continued from Page S/16)

niques oriented toward experienced users.

Data base inquiry is a third area where the needs of the small business have not been addressed by industry developments. While the small firm does not have the requirement for huge on-line data bases in the over 100M-byte range, he does have a data base inquiry requirement.

Inventory status, customer account status, order status, etc., with a data base in the 5M- to 10M-byte range, would be extremely useful. His alternatives are an in-house small computer system with a data base inquiry capability or an on-line terminal connected to a large central computer service bureau.

The first solution is precluded to most small businesses by reason of equipment cost. The second is usually precluded by reason of line cost.

Solution suppliers must look beyond the general needs just discussed and develop an understanding of the small businessman's specific accounting practices, costs, discount structures, market areas, etc.

O'Brien is a staff member at Western Union Data Services Co.

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As Price of Microprocessors Falls

Competition Seen Increasing in Low-Cost System Mart

By Patrick Ward
Of the CW Staff

As the cost of microprocessors falls, users will find more vendors competing for the low-cost-computer-system pie.

Right now, the differences between minicomputers and microcomputers center on cost and speed, noted Saul Newman, president of Applied Digital Technology, Inc., a Chicago-based systems house.

"Within a few years, those differences will disappear," he said. "Micros will move upwards to where they have the same power and speed as today's minis."

Minicomputer peripheral vendors especially seem to scent an opportunity here for them. In a recent letter to stockholders, Sykes Datatronics President Rod Belden explained why.

"Until recently, the production and application of minicomputer systems has been dominated by a handful of minicomputer manufacturers. Now that microprocessors are becoming available in quantity, the price of the computer portion of a computer system is becoming insignificant by comparison with the cost of peripheral equipment and the software included in the system.

"For example, a microprocessor can be purchased today in semiconductor form for $300 or less. A microcomputer system with main memory can be assembled for $1,000. The peripheral data storage systems such as the Sykesdisk cost $3,000 or more," he observed.

"As a result of this new cost ratio, Sykes and other companies with strengths in peripheral equipment and software can compete successfully in market applications of low-cost computer systems. We are approaching the day when, as part of the application of our products, Sykes will manufacture and market a low cost computer system," he stated.

Two other minicomputer peripheral makers, Applied Data Communications (ADC) of Santa Ana, Calif., and Datum, Inc., of Anaheim, Calif., indicated they had similar plans in mind.

The stand-alone systems from Sykes might handle laboratory processing, data communications or accounting-type applications, Belden predicted. Business processing capabilities would be more than a ledger card accounting machine, but probably less than a typical small business system of today because of disk storage limitations, the president of the Rochester, N.Y.-based firm said.

"I'd expect we could produce a floppy disk-based system for less than IBM's System/32," Belden remarked.

Other Applications

ADC foresees itself using microprocessors in stand-alone dedicated systems, according to President Pat Kane. An off-line print station between a high-speed line printer and a magnetic tape drive would be one example, he said.

Microcomputers are just a cheaper and slower means for handling a lot of applications minis now perform, Kane remarked.

Kane sees minicomputers "evolving upwards toward the lower end of the 370 line," "They're also going to pick away at the NCR, System/3 area where processing speed is not that crucial," he added.

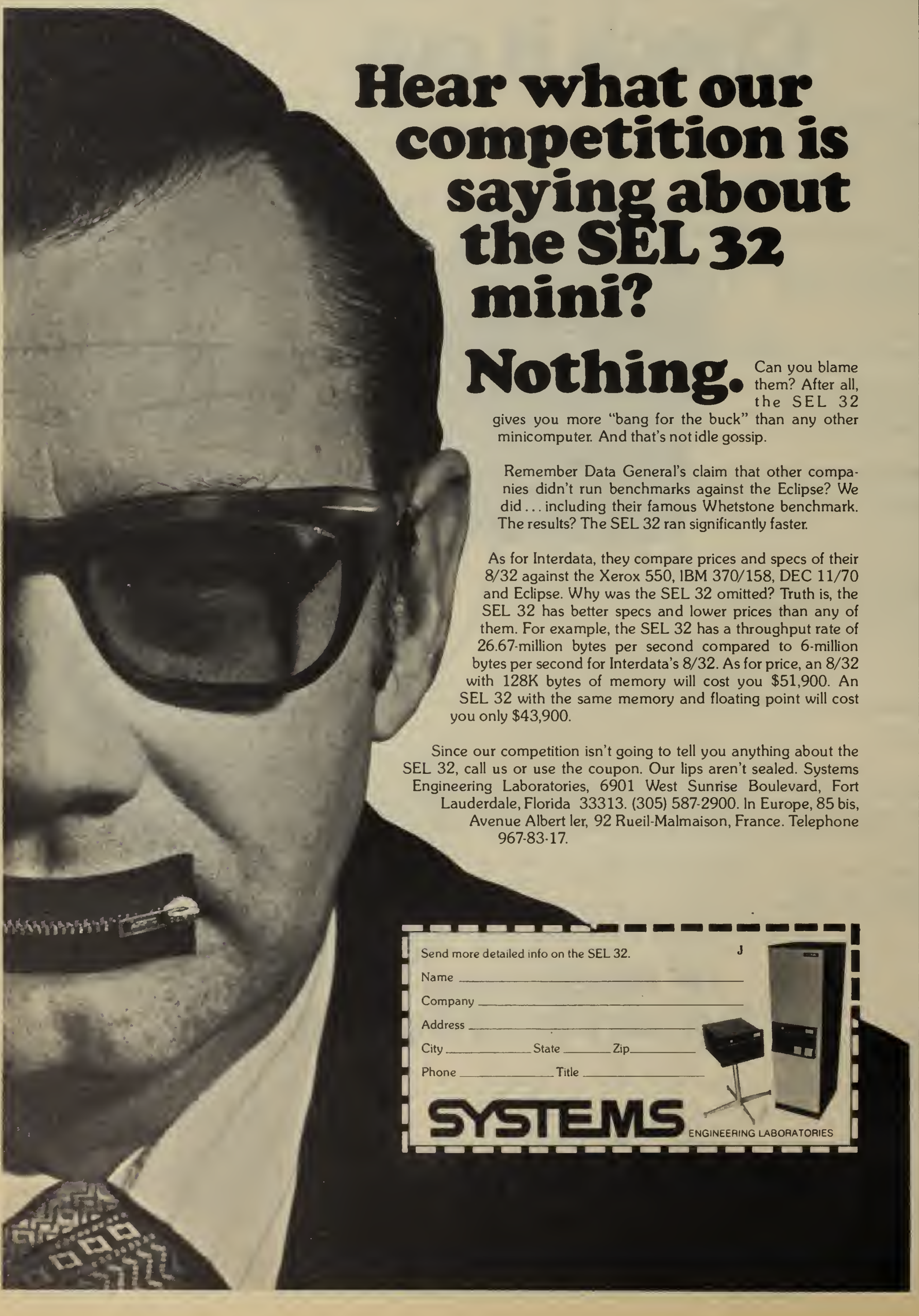
Minis might also host several microcomputers in remote job entry, process control and telecommunications control applications, he predicted. One problem, though, is the lack of software to do some of these jobs on a 16-bit mini. "That's why some of the minimakers are going to 32 bits," he said.

Also minicomputers will need a little more speed because the speed of their peripherals is getting so fast," he added.

Price remains a limitation on the more widespread use of small business systems, according to Donald L. Schnitter, director of marketing services for Basic/Four Corp. of Santa Ana, Calif.

Disks, printers and other peripherals are still costly, he said. While floppy disks have allowed vendors to make progress on disk storage costs, the next task is to achieve a similar breakthrough on the printing end, he said.

'Eeenie, Meenie, MINI, Mo . . .'



Functional Approach Key To Buying Turnkey System

By Wayne Churchman

Special to Computerworld

The advent of the minicomputer has extended computer power into numerous application areas where high costs would have previously prohibited it.

In many of these cases, users want to buy "a turnkey system," a fully developed hardware and software package that provides guaranteed performance.

For the same application, however, various vendors may offer turnkey systems which are similar from a functional and performance standpoint, but differ markedly in terms of their hardware and software approaches.

Successful Procurement

Therefore, a successful turnkey system procurement should encourage the kind of bidding in which potential vendors can demonstrate the strong points of their particular approach.

The procurement, of course, must also include methods for specifying the system requirements, for selecting the system which best meets those requirements and for contracting for the implementation of the selected system.

The key to any procurement procedure, though, is specification of the system requirements. Many users make the mistake of using a physical specification of the type normally used to specify construction work.

The physical specification identifies the minimum physical requirements of the hardware and software in detail and is usually used in conjunction with a low-bid system selection. Proposed systems which fail to meet a specified minimum requirement are rejected for noncompliance.

While it works well for buying concrete, this approach has inherent deficiencies when applied to the procurement of a turnkey computer system.

The physical specification fails to consider the system as a single integrated entity, but rather considers each element of the system separately.

Total system capabilities, as expressed by such measures as throughput or response time, are more significant than the capabilities of individual component specifications, such as memory cycle time or number of registers.

Physical specifications are often used as a matter of convenience. In fact, most physical specifications are written around one company's hardware and software. Such a specification obviously gives that company a tremendous competitive edge.

Functional Specifications

The specification problem can be solved by the use of a functional system specification which places the emphasis on the functional and performance requirements of the system. The functional specification does not omit physical requirements, but they are stated, however, as nominal specifications intended to provide a framework within which each bidder can propose the best integrated system to meet the overall functional requirements.

The first problem with functional specifications is that system selection becomes more difficult. If physical requirements are interpreted to be nominal specifications, proposals can no longer be rejected for noncompliance. Low-bid system selection must be replaced with a cost/performance evaluation of the proposals.

A second problem is the flexibility which the functional specification provides during the proposal process is not desirable, in fact is intolerable, as part of the contract for system development. The contract requires better definition than provided by a functional specification.

The solution to this problem is a two-phase contract in which technical specifications are developed prior to the beginning of system development.

The functional system specification can be organized in a number of ways. The following includes all the important elements of a functional specification:

System Concept Summary: An introduction to the required system and the application for which it will be used. In addition, it is helpful to have a brief statement of work which describes the contractor's responsibilities. Special project requirements such as user participation in the system development should be described in this section.

Physical Requirements: A description of

(Continued on Page S/22)

Sample RFP Outline

If a user chooses to procure a turnkey minicomputer system through functional system specifications, the request for proposal (RFP) should clearly indicate this to vendors, and show how the functional specifications will be used in evaluation of the proposals. Here is a sample RFP outline:

- *1.00 Invitation for Proposals*
- *2.00 Definition of Terms*
- *3.00 Proposal Requirements, Information and Conditions*
  - .01 General Information
  - .02 General Form of Contract
  - .03 Inquiries
  - .04 Pre-bid Conference
  - .05 Examination of Site of Work
  - .06 Preparation of Proposals
  - .07 Receipt and Opening of Proposals
  - .08 Proposal Guaranty
  - .09 Proposal Modification
  - .10 Withdrawing Proposals
  - .11 Irregular Proposals
  - .12 Rejection of Proposals
  - .13 Disqualification of Bidders
  - .14 Statement of Qualifications
  - .15 Proposal Content and Format
- *4.00 Consideration of Proposals*
  - .01 Proposal Tabulation, Evaluation
  - .02 Proposal Presentations
  - .03 Method of Proposal Evaluation
  - .04 Evaluation Criteria
- *5.00 Documentation Controls*
  - .01 Revision of the RFP and Specifications
  - .02 Revision Notice
- *6.00 Proposal Forms*
- *7.00 Contract Award and Execution*
  - .01 Award of Contract
  - .02 Retention of Proposals
  - .03 Return of Proposal Guaranties
  - .04 Surety Bonds and Insurance
  - .05 Sureties
  - .06 Execution of Contract
  - .07 Failure to Execute Contract
- *8.00 Contract and Bond Forms*

Successful Turnkey System Purchase Requires Use of Functional Approach

(Continued from Page S/21)

the required computer and peripheral equipment. Hardware specifications should be stated as nominal values. It is important to state any preferences the user may have and also to state any alternatives the user sees as being acceptable.

Performance Requirements: A statement of the important system performance parameters. These may include system availability, throughput, response time, expandability, failure mode integrity and any others which are important to the application.

Functional Requirements: A statement of what the system must do. The functional capabilities described should give the bidder a clear idea of what the system must do without being too restrictive in terms of how the functions are accomplished. Again, preferences or examples can be used, but they should be represented as nominal requirements.

Information Requirements: A definition of the type and volume of data which the system must process.

Implementation Requirements: A detailed statement of the contractor's responsibilities for system implementation. This section should detail requirements for project management, system development, installation, test, maintenance, training and documentation. The schedule requirements should also be stated in this section. The requirements contained in this section may be interpreted literally, if desired, by including a statement in the request for proposals to that effect.

Writing a good functional system specification is not easy. The functional approach provides the desirable flexibility to the system specification at the expense of adding the problem of interpretation.

There is an increased requirement for responsibility on the part of both the user and the bidder. The user must make sure the specification honestly represents the requirements of the system he is trying to buy. The bidder has a responsibility to propose a system which meets fully the intent of the system specification.

Solicitation and Evaluation

Once the system specification has been completed, it is combined with a request for proposals (RFP) and general specifications to form the bid document.

The RFP must give the bidder a clear idea of the functional nature of the specification and how it will be used in the evaluation of the proposals.

It must also specify what information is required in the proposal, where and when proposals will be received and the conditions of submitting a proposal.

Let us turn for the moment to the problem of proposal evaluation.

Many schemes have been proposed for performing a cost/performance evaluation of computer systems. The problem is to come up with a way of relating the capabilities of a proposed system to the bid price of the system so a single measure of cost/performance is available for comparison purposes.

The most sensible approach to a cost/performance evaluation is one in which the capabilities of proposed systems can be compared in terms of dollars, which can then be directly related to the bid prices. Evaluation techniques which develop some figure of merit for each system in terms of a point total have one glaring deficiency: how is the point total to be related to the bid price?

Proposed systems can be evaluated through the application of evaluation criteria which represent, in quantitative terms, the importance the user places on specified attributes of the computer system.

It is also important to evaluate the vendor and the vendor's capabilities. This can be accomplished through the use of the same technique.

Evaluation Criteria

The evaluation criteria identify items to be evaluated and an assigned dollar value for each item. The dollar value represents

(Continued on Page S/23)

Right Approach Aids Purchase

(Continued from Page S/22)

the maximum penalty which may be assigned for each item. Penalty assignment should consider the projected system life.

Penalties may be assigned on a one-time or recurring basis, depending on the nature of the evaluation item, up to the maximum penalty specified for each evaluation item.

The assignment of penalties is based on the existence of some deficiency which will require additional development, purchase or support or a deficiency which will limit the useful benefits of the system.

Penalty assignments are based on a zero value for the proposal which best meets the specified requirements for each evaluation item as stated in the system specification.

A summation of the assigned penalties for each proposal is used in conjunction with the bid prices to determine the successful bidder..

The specific evaluation items chosen will be different for every procurement but should relate closely to the organization of the system specification. Vendor qualifications can be judged on the basis of the folloiwng evaluation items:

A. Experience and Customer Ratings.
  1. Installed systems of similar size and nature.
  2. Standard computer hardware and software base.
  3. Length of experience.
  4. Specific application experience.
B. Company Resources.
  1. Personnel.
  2. Facilities.
  3. Depth of resources.
  4. Financial.
C. Support Capabilities.
  1. Maintenance organization.
  2. Location of maintenance support.
  3. Software support.

The final important element of the functional approach to a turnkey system procurement is the two-phase contract.

As previously discussed, one of the problems presented in the use of a functional specification is it does not provide sufficient definition for a contract to develop the system.

There is a need for a single document which specifies in detail the system and the work to be performed by the contractor.

Phase I of the contract is the final design phase during which technical specifications are developed by the contractor in cooperation with the user.

These technical specifications should satisfy the requirements of the system specification and should be specific to the hardware, software and services offered in the contractor's proposal.

Other requirements should be developed during Phase I so the technical specifications completely describe the hardware, software and services to be provided by the contractor during the second phase of the contract. The following items should be included in the technical specifications:

- Detailed specifications for all major equipment.
- Specifications of all necessary minor equipment.
- Final design and drawings for any special consoles or other hardware.
- Detailed system flowcharts.
- Complete functional descriptions of all computer programs including I/O requirements.
- Data base design.
- Display and report formats.
- Installation drawings.
- Detailed test procedures.
- Detailed documentation standards.

A notice to proceed with Phase II, system development, is issued only after approval of the technical specifications by the user.

If, for some reason, agreement cannot be reached between the user and the contractor on the technical specifications, the contract should contain a provision to pay the contractor for the work done with no further obligation to the user.

The payment should not be excessively high. The contractor should be encouraged to make his profit during Phase II.

Churchman is scientific programming supervisor for the City of Dallas.

Six of the best reasons for buying Data General computer systems.

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Mini Bits

Communications Controller Offered for Tally Printers

GAITHERSBURG, Md. – A programmable communications controller from Zeta Corp. enables Tally line printers to emulate the IBM 2780, Control Data Corp. impact printer, Univac DCT-1000, Burroughs 9353 and other "read-only" printer communications protocol, Zeta said.

The controller is preprogrammed by Zeta and may be incorporated into existing Tally printers by users, or it may be purchased with a printer.

The device is contained within the Tally printer on two plug-in circuit cards. It is readily removable for subsequent reprogramming if the user's host computer or communications protocol is changed, the firm added.

The programmable controller was designed to fit into the 125-, 200-, 300- and 400 line/min printers. Zeta is at One West Deer Park Drive, 20760.

31-Column Dot Matrix Printer Fulfills Numeric-Only Needs

GALION, Ohio – North Electric Co. is offering a 31-column, high-speed dot matrix printer to fulfill numeric-only printing requirements.

Among the features of the printer is the ability to recognize incoming data so that no strobe is required. Input may be decimal or BCD.

The unit will accommodate many interface requirements such as TTL, CMOS, Various Voltages and Contact Closure, the firm said. An internal buffer collects the data asynchronously and prints when commanded at a rate of 110 char./sec.

Other features include a printer busy signal, paper wind-up motor and packages which allow the printed data to be kept under keylock but observed by the user. The printer is available with or without an internal power supply for $950 from the firm, which can be reached through Box 688, 44833.

Reader Works With Nova, DCC 116

COSTA MESA, Calif. – WBS Systems has a paper tape reader for use with Data General Nova and Digital Computer Controls (DCC) D116 computers.

The reader will process 5-, 7- or 8-level tapes at speeds of about 200 char./sec. Everything needed for installation – reader mechanism, mounting panel, power supply, reader electronics, signal cable and plug-in connectors – is included, the vendor said.

Cost of the tape reader is $535, the firm said from 120 23rd St., 92627.

First Hospital With S/32 Finds

Small In-House System Saves $12,000

PETOSKEY, Mich. – Lockwood-MacDonald Hospital here has become the nation's first hospital to use IBM's newest and smallest computer, the System/32.

"We've installed the System/32 to replace a system which, though it worked well, was slower and less responsive," Wendell C. Trent, the hospital's administrator, said.

Formerly using a terminal tied by telephone to a computer in Detroit, Lockwood-MacDonald had automated payroll, accounts receivable and patient billing services only.

Now, with its own computer, the hospital produces its own payroll, accounts receivable, patient billing, accounts payable and general ledger reports.

"We'll have information in computer-usable form," Trent added, "so that when we need special reports, we can compile them in a fraction of the time and with little manual effort.

"Financial analysis shows we're saving $12,000/year by having our own computer instead of using a terminal tied to a data services organization in Detroit.

"But, the $1,000 a month we save using our own computer is not nearly as important as having complete, accurate information about our hospital," he said.

Major Advantage

"The major advantage in having a small, compact, easy-to-use computer right in our own business office is the ability to enter and retrieve information in a timely, completely accurate, totally secure environment," Trent said.

Installing the System/32 three months after it was introduced by IBM's General Systems Division, Lockwood-MacDonald also ordered the Industry Application Program (IAP) for hospitals, which handles functions of patient billing, accounts receivable, payroll, accounts payable and general ledger.

"I spent one man-week each month just preparing the financial reports the general ledger application produces automatically as a by-product of other work," Wayne Hagerman, controller, said.

"The data servicer, which only gave us accounts receivable and payroll services before, was costing us $1,000 more per month than the complete hardware and software package we're now using," he recalled.

More than money, however, the System/32 means savings in time and the elimination of clerical errors.

"Accounts receivable, for example," Hagerman said, "can be a complex problem for a hospital unless extreme care is taken to enter all charges accurately and to bill patients in a timely, personal fashion.

"No one will pay a wrong bill – and few people will readily respond to a 60- or 90-day late bill."

The key, then, is to use the small system in a up-to-date accurate manner. The IAP handles posting, statement printing, aging analysis and exception reporting.

As payments are posted, the system automatically updates its accounts receivable and general ledger files at the same time.

"Then," Hagerman stated, "when it comes time to prepare general ledger reports, the system has the latest information to tell me immediately what I need to know."

Answer Found

"Federal and state governmental agencies and insurance companies have imposed a heavy paper workload on American hospitals," Trent summarized. "We have found that, to meet those requirements without adding a host of clerks and a warehouse of files, a small computer is the answer."

Installed April 3, the system prepares small diskettes holding data to be loaded directly into the computer, thereby providing information availability 24 hours a day.

"We've had to add no new personnel to convert to our in-house computer," Hagerman said. "The two clerks who formerly worked full time with our terminal have now been trained to operate the system and the independent IBM 3741 data encoder station.

"With very little training, they have stopped data entry operations for a remote computer and are preparing information for, and operating, our own on-site system," he said.

With some 16,000 transactions to be entered each month, two data capture positions are needed at Lockwood-MacDonald.

"Although Lockwood-MacDonald is a small hospital," Trent noted, "we have the same or greater information needs as a large city medical center, and we must keep patient information as accurate and as readily available as possible."

MNTL Logic Labs Links PDP-11 With 80-, 96- Column Device

HAMPTON, Conn. – MNTL Logic Laboratories has interfaced its 80- and 96-column card reader/punch DPG-1 to Digital Equipment Corp.'s PDP-11.

The DGP-1 goes into the XX, YY or ZZ software slot. Since XX is used for Pseudokeyboards and ZZ is used for IBM 2780 emulation, the YY slot is recommended.

Both input and Output data are spooled in accordance with normal RSTS/E conventions.

The input is spooled and no special features may be employed for a particular card.

On the output side, however, some normally unused Ascii control characters have been employed to allow the user to be able to select hoppers and stackers and to select print-only, punch-only or print and punch the same or different data on the same card, the firm said.

These control characters may be written to the device like a carriage control character on a printer or may appear anywhere in the output stream.

The DGP-1 requires space for one BB-11 in the PDP-11. Fourteen-foot cables are standard, but they may be up to 50 feet in length as an option. There are several models available, but minimum read is 200 card/min, and typical punch speed is 60 card/min.

A reader/punch in either 80- or 96-column model without printing feature, with interface, RSTS/E handler and diagnostic software is $10,500. The firm can be reached through Box 124, 06247.

Breadboard Interfaces Cassettes to Minis

NEWTON UPPER FALLS, Mass. – Memodyne Corp. offers a Philips Cassette "breadboard" package consisting of the Model 763 transport, all-electronic circuitry, power supplies, control switches and in/out connections for direct interfacing into small systems and terminals.

The electronic circuitry includes the servo drive for moving tape bidirectionally at 20 in./sec or 120 in./sec and 5% stability, read and write amplifiers for two channels capable of handling phase encoding, complementary return to bias, NRZI, pulse ratio and other types of saturation digital coding.

Motor control inputs are TTL-compatible and include run/hold, forward/reverse, fast/slow. The amplifier inputs are levels. These levels are reproduced when the tape is played back.

The price is $980 from the firm at 375 Elliot St., 02164.

Progress Report:

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10% of Usual Mainframe Cost

College Conferencing Net to Cost $2/Hour per CPU

NEWARK, N.J. – The advent of high-performance minicomputers has reduced the cost of computerized conversations to the point where, their widespread use is now economically feasible, according to Dr. Murray Turoff of the New Jersey Institute of Technology (NJIT), formerly Newark College of Engineering.

Turoff, associate professor of the institute's Computer and Information Science Department and associate director of its Center for Technology Assessment, anticipates the installation this summer of a minicomputer here will allow development of a conversation network at a central processor unit cost of less than $2 per hour.

"This cost is approximately one tenth the usual cost of $20 per hour for mainframe computers used in this application," said Turoff. The institute has recently bèen awarded a grant from the National Science Foundation (NSF) to develop computer conferencing on a national scale in a project directed by Turoff.

"At these rates, we will probably see future costs charged on a message basis rather than hourly basis," he predicted. "And, as a result, we can easily compute total cost, including preparation, of about $1 per message.

The NJIT system will be built to service up to 100 participants initially and be expandable up to 600 or more users.

Economically Practical

"Other systems have been developed on Digital Equipment Corp. PDP-10 or Univac 1100 series computer," Turoff explained. "The advent of inexpensive terminals and directly addressable M-byte-memory minicomputers makes them economically practical.

"Introduction of the 32-bit-oriented Interdata 7/32 convinced me conferencing was economically feasible," Turoff remarked.

"Direct access to 1M bytes of mainframe memory is essential for the successful operation of a conferencing activity for a large number of users. Conferencing programs, data bases and conference discussions require very large amounts of on-line storage.

"For example, if a participant is composing a letter on his CRT terminal, he needs access to a workspace of 4K bytes of information," he continued. "Multiplying this by 100 participants adds up to a requirement of 400K bytes of on-line memory.

The 32-bit Interdata minicomputer can handle that efficiently and economically since mainframe memory can be used, and swapping requirements to disk storage are minimized. Service for a large number of users is feasible."

NJIT added the first Interdata Model 7/32 minicomputer system to its specialized computer science laboratory in 1974. It has been employed since that time in a wide range of research projects.

The grant the Institute received from NSF will include the purchase of a second Interdata Model 7/32 system as well as peripheral equipment.

Computer conferencing participants use a system's terminals to confer and discuss subjects at their own pace.

Participants gain access to a computer conference by typing in their key codes and then asking for an updated review of previous conversations contributed by the other participants. These conversations have been stored in the computer's memory.

Basically, Turoff explained, a computer conferencing system works like this:

"Imagine the computer as a very large blackboard that has been blocked off into different areas.

"A human monitor who is familiar with the problem under discussion lists the people who will participate on the blackboard. He writes on one part of the blackboard the names of each participant, a brief description of their association or qualifications for the project and their home and office telephone numbers. Once listed, participants may read and write on the community blackboard at their own convenience.

"The monitor and participants develop data, including a glossary and bibliography, on the subject under discussion. The data is identified by its source, either within the community or outside of it.

Conferencing occurs when participants write labeled messages to each other on the blackboard, which is, in effect, the computer's memory. The computer stores these messages which may later be retrieved and displayed together with their source and any other inputs added to it by other participants.

"A key factor in computer conferencing is participants have the opportunity to clarify their ideas in the discussion without interfering or interrupting another conferee."

Big Drawing Plotter Features Built-In Micro

PALO ALTO, Calif. – The ability to handle 22-in. by 34-in. drawings with plotting speeds up to 800 increment/sec are two of the features offered by the Glaser DP-1600 computer graphic output plotter.

The device is said to attain an accuracy of .004 in. The built-in microprocessor simplifies the drawing of straight lines. The slope generator requires only the two end points of the line to be specified.

In addition, an internal 55-character symbol generator is incorporated so software and data transmission needs are further reduced.

The DP-1600 is an expanded version of the Glaser DP-1500 computer graphic output plotter. Both plotters offer an exceptional capability for users of smaller computers and programmable calculators.

The plotter is also particularly useful for telephone line time-share modem applications because the data to be transferred is reduced to an absolute minimum.

Price of the DP-1600 is $14,000 from the firm at 225 Forest Ave., 94301.


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By Monitoring Car's Functions

Mini in the Pit May Be Racer's Edge

INDIANAPOLIS – A mini tucked in a corner of the pit area will help one of the most successful automobile racing teams finely tune its cars for races, "listen in" on the car's performance during a race and help plan race strategy by supplying information to the pit crew.

Team McLaren will use the computer to get car performance figures never before available. Performance information will be monitored by sensors in the car's engine. Other sensors will monitor the car's handling characteristics.

A small telemetry transmitter in the car will receive electrical impulses from the sensors and send the information to a receiver in the pit area.

The signals are then fed into a Data General Corp. Nova 2 mini which makes comparisons between various readings and does the computations that make the data meaningful to the pit crew.

"The car will have 14 of its functions monitored," said Tyler Alexander, Team McLaren's director of engineering. "The computer will track the ride height of each of the four wheels, the forward and sideward acceleration, the oil and water temperature, oil and water pressure, manifold pressure, air inlet temperature, turbocharger airflow and fuel flow."

Alexander noted some of the measurements will be used when preparing a car for a race, and others will play an important role during a race.

During a race, the computer will keep track of the fuel the car uses. "This is vital in a race," Alexander said, "because there previously was no way to accurately measure the amount of fuel in the car. On the one hand, we don't want to call a car in for unnecessary refueling, but, on the other hand, we don't want the car to run out of fuel."

The small, propeller-like flowmeter, inserted in the fuel line, will monitor the amount of fuel that goes to the engine. Sensors count the flowmeter's revolutions and radio the information to the computer, which converts the revolutions into fuel consumption.

"Oil temperature is another measurement that can play a role in determining race strategy," Alexander said. "If we see the oil temperature rising, it could mean increased friction in the engine, which is an indication a part is failing.

Depending on the degree of increase, the position of the car and how far along the race is, we can tell the driver to continue at full speed, slow down enough to maintain his position or call him into the pits before the engine is damaged."

The information the computer calculates will be displayed either on a CRT display or typed out on a teletypewriter. "The information we get on the visual display will never be more than one second old," Alexander said.

In addition to supplying the computer, CRT and teletypewriter, Data General wrote the programs which transform the telemetry data into standard units of measurements and which make all necessary calculations.

Shown here in the engine test area, a Data General Nova 2 will be in the pits during a race, where it will "listen in" on the car's performance. Information from the mini will be displayed on a CRT or typed out on a teletypewriter.

Micos System Gets Swapping Memory

ELMSFORD, N.Y. – The capability of the Micos minicomputer system from Mini-Computer Systems, Inc. has been enlarged with a high-speed, random-access swapping memory.

Users electing the solid-state Model 1301-18 swapper rather than standard system's disks will have an average access time of 2 µsec and a transfer rate of 2M byte/sec.

With the optional swapping memory, the Micos system will support two to four times as many terminals without any decrease in the response time of individual terminals, the firm said.

Model 1301-18 consists of a control board occupying a single slot in the computer chassis and an external chassis containing up to 64K bytes of memory. A system can be configured to build a memory beyond 512K bytes.

Each 64K-byte unit permits the user to allocate space per terminal as desired. The memory consists of MOS semiconductor chips on plug-in circuit boards.

The Model 1301-18 swapper is priced at $8,500 for the first 32K bytes of memory and an additional $3,500 for each 32K bytes above that.

The firm is at 525 Executive Blvd., 10523.

Facit-Addo Interfaces Tape Punch, 5275

SECAUCUS, N.J. – Facit-Addo, Inc. has an interface for the Facit 4070 75 char./sec tape punch to the IBM 5275 numerical control station.

The interface board works in a character-by-character mode and includes an SPST switch for selecting either EIA RS-232 or ISO 8 channel code.

A single cable is supplied with the 4070 tape punch machine to connect it to the numerical control station. Both the interface and the signal cable are made to be purchased as one unit for $710.

The Facit 4070 is a compact, 0 to 75 char./sec tape punch. The firm is at 501 Winsor Drive, 07094.

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We've selected leading experts from around the country to give seminars on some of the most important topics on today's EDP scene. These seminars are current, practically oriented, and packed with detailed information. They will help you save time and money. And they can give you the information you need to increase your installation's efficiency. In an increasingly complex and fast-changing EDP world, these seminars are even more important to your company, your installation, and you. Here is our current seminar schedule:

Data Communications

Course #1010–

Practical Data Communications Systems and Concepts

This course will give you the information you need to master the newest developments in Data Communications. Led by the nationally recognized teleprocessing consultant, Dr. Dixon Doll, the course covers recent changes in areas like SDLC. HiD-LoD, DDS, newly approved major revisions to WATS, and the impact of satellite carriers. This seminar runs two days, and total cost, including workbook, reference materials, luncheons and continental breakfasts is $350. Additional registrants from the same company qualify for a reduced rate of $300. Current schedule is as follows:

Orlando - July 2-3
San Diego - September 29-30
New York - October 13-14

Course #1020–

Advanced Teleprocessing Systems Analysis and Design

This course is a follow-up to Course #1010, with special emphasis on problem solving techniques for minimizing operating costs in commercial data communications networks. Also led by Dr. Dixon Doll, the course covers procedures, approaches and algorithms for evaluating and cost-optimizing network organizations.

This seminar runs three days, and total cost, including an extensive set of customized course materials, luncheons and continental breakfasts is $450. Additional registrants from the same company qualify for a reduced rate of $400. Current schedule is as follows:

Miami	December 1-3

Data Base Design

A practical approach to the design, implementation, and maintenance of data base systems.

Effective data base system design requires both a complete knowledge of the facilities provided by a data base package, and a basic understanding of the mechanisms which can be employed to construct data base systems. In fact, the former is of questionable value without the latter.

This course is a package independent examination of the techinques required for the design of effective data base systems. The topics covered include:

- *Effective Record Design*
- *Physical Storage Techniques*
- *Optimum File Organization and Indexing Techniques*
- *File Integration*
- *and much more*

Given in association with Leo J. Cohen and Performance Development Corporation, this course reinforces the lecture material with workshops, in which attendees apply the techniques just learned, to practical problems.

You should attend this seminar if you are (or will be) involved in the design and/or implementation of a data base system and whether as a Data Base Designer, Planner or Analyst.

This course runs for 3 days and costs $350., including course materials, continental breakfasts and luncheons. Additional registrants from the same company qualify for a reduced rate of $300. Current schedule:

New York	September 22 - 24
Denver	December 1 - 3

How to draft effective legal agreements

A one-day workshop for non-legal, technical people.

Because companies want to save legal fees - or because they do not think they can find a lawyer who understands their industry - they often have non-legal technical people draft agreements. This is done both by suppliers and users in the computer industry, and the resulting agreements are used both for specific transactions and as "standard forms". In either case, there can be significant problems. It is easy to overlook important legal points, and the results of such omissions can often be very damaging.

This comprehensive one-day workshop on the drafting of effective legal agreements will give you the basic skills necessary to write better legal agreements and to spot items that really require the attention of lawyers.

Our workshop leader is Roy N. Freed, the nationally recognized expert and author in the field of computer law. Mr. Freed will conduct the workshop with a great deal of interaction among participants, and all participants will receive a complete workbook on the subject.

The cost for this one-day workshop is $135., including course materials and luncheon.

New York	October 8
Boston	October 15

Performance Evaluation and Improvement

A seminar actually designed to save your installation money.

This course starts with a discussion of questions and specific problems attendees have about system performance at their own installation. Then step by step each attendee will learn the methodology necessary to understand the problems and implement the answers. The techniques presented at this seminar are in effect at numerous installations today, and have extended the life of one S/360 for more than two years—a savings, at last estimate, of more than $700,000 for one user.

Our course leader is Saul Stimler. His book, *Data Processing Systems: their performance, evaluation, measurement, and improvement*, will be an important part of the seminar. As well as case studies, topics that will be covered include:

- *Criteria for quantifying performance* • *Pencil and paper analysis of a system*
- *Benchmarking techniques* • *Realtime, batch, and interactive time sharing systems*

You should attend this seminar if you are a data processing professional or corporate executive whose responsibility it is to plan, benchmark, evaluate, or improve data processing systems.

Cost for the entire seminar, including continental breakfasts, luncheons, and all course materials (including a copy of Saul Stimler's book on the subject) is only $250.

Current schedule:

New York	September 29-30
Washington, D.C.	October 20-21
Chicago	October 27-28
San Francisco	January 19-20

THE EDP SEMINAR SERIES sponsored by COMPUTERWORLD

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DPer Gets Grant to Make Theft Impractical Because of Expense

IOWA CITY, Iowa – A computer scientist here has received a grant from the National Science Foundation (NSF) to develop a computer security system that will make the act of stealing so expensive that theft will become impractical.

University of Iowa Prof. John Robinson described his cryptographic system as "not merely a scrambling technique, but rather a redundant privacy transformation that involves more bits out than in."

The technique can be compared to making a computer program into a picture puzzle and then adding irrelevant bits of data, he explained.

Robinson's technique increases the cost of stealing in two ways: first, by requiring the intruder to have a thorough knowledge of the class of nonlinear transformations used in the program and, as a second line of defense, forcing the intruder to do extra computing of the type one might encounter in decoding an error-correcting code, Robinson said.

In any case, Robinson added, it would take even an authorized computer operator some time to reassemble data into a computer printout, but it would take even longer for an unauthorized person because he would have to determine what data was for the program and what information was for deceptive purposes.

The Only Problem . . .

The only problem Robinson sees now is how to validate exactly how good the system is, he said.

"You might get a good number tied to a certain level of security, but how can you say one system is twice as secure as another?" he pointed out.

Robinson is designing the security technique for users such as financial institutions and other organizations with proprietary information about key customers, market forecasts and new products on their systems.

Loss of such information could cost this class of user hundreds of thousands of dollars, he explained.

The system also would be applicable to Social Security files, credit bureaus and other systems with sensitive information.

Robinson estimated the encryption technique will cost users 10% on throughput, but "for teleprocessing systems, encryption is about your only choice," he said.

The grant of $20,800 was awarded for one year.

High School Students Get Hookup to CPU

BETHPAGE, N.Y. – Computer students at Walt Whitman High School here now have a hookup with Grumman Data Systems that provides them free access time on a large computer system.

The system provides the school with the capability to work in 13 additional computer languages.

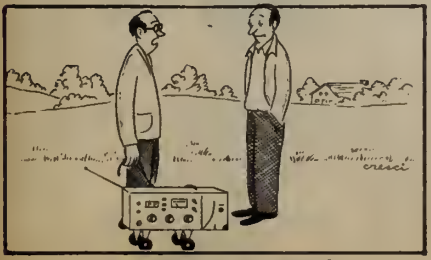
In exchange for access time on the Dartmouth Time-Share System (DTSS), the students have been asked to develop a self-teaching lesson in Fortran, the language used for scientific programming in this country.

"One of the DTSS package parts is a sequence of self-teaching programs that allows students to sit down and learn to program in Basic," Doris Stoudenmire, the mathematics teacher at Walt Whitman who heads the school's extensive computer program, explained.

"Now, we will work on a self-teaching package in Fortran as a student project."

The science department at Whitman High uses computer-assisted instruction with simulated real-life situations in which the computer investigates problems instead of having them done in a laboratory.

"Our objective," Stoudenmire continued, "is not so much to prepare the students for jobs, although some are headed in that direction, but to give them a skill useful in today's world and essential if they intend to do any work at all in engineering or the sciences."



'He's a Data Retreiver.'

Mini Turns Matchmaker for 23 Couples at Senior Prom

By Nancy French
Of the CW Staff

SOMERVILLE, Mass. – Thanks to the efforts of the computer programming class, at least 46 seniors who might have stayed home had dates for the recent Somerville High senior prom.

The solution was a matching program, written in OS-8 Basic by second-semester programming students and run on the school's 12K Digital Equipment Corp. PDP-8E minicomputer.

About 200 seniors answered a two-part questionnaire containing 26 questions. The first part consisted of 13 questions on each person's characteristics and lifestyle.

Do you smoke? Drink? Like to dance?

Another question asked for a description of the person's personality. Still others concerned sharing expenses, double dating and curfews.

The second set of 13 questions concerned qualities each expected from a date. One could ask for a date who liked to dance mostly slow dances, or someone who was a nondrinker, for example.

"Height, of course, was of primary interest, with almost all the girls wanting to be matched with tall guys," programming teacher Paul Murray said

Murray explained the questionnaire was designed so that question one from the first part of the questionnaire corresponded with question one from the second part, and so on.

"We put all the female characteristics in one file and all the male requests in another," he said. "Then we took the male requests one at a time and ran them against all the female characteristics."

No Male Chauvinists

Then, "so we wouldn't be called male chauvinists, we reversed the process so both males and females could see who they matched with and who was available to date," he said.

Each student received a printout with the names and homerooms of the students with whom he or she agreed on 75% or more of the questions.

Four teams of four students each wrote a part of the program, and the most serious problem the students faced was keeping the data within the limits of the machine, Murray said.

"We didn't really know the limits of the machine when we got started," he recalled, and since completing the project, "we have heard of other schools with PDP-8s who had been unsuccessful writing such a program.

"We rewrote the program to put the data into blocks and then collated the data in one data block," he explained. That way it worked.

A list of potential dates had an uplifting effect on at least one student, who said he probably wouldn't have gone to the prom without the computer service.

"This is a big school – I only know about half the girls on my list – and the service just made me more confident about going up to a girl and asking her out," John Dell'Anno said.

According to Murray, the school has received several requests for the program, and the prom committee expects to use the computer again next year to match up the seniors for their big night.

UK Scraps Midterm Census Plan

Special to Computerworld

LONDON – The controversial 1976 midterm census has been scrapped, the victim of a government economy drive. The decision will save about $50 million.

The census had come under severe criticism on privacy grounds [CW, May 7], but planners had argued that it would be unwise to continue with 1971 data until 1983, when the next regular census data would be available.

They noted in particular that virtually all local authority boundaries had been redrawn since the 1971 census.

Up-to-date figures, the planners contended, were needed for planning schools, transport, housing and employment. But the critics noted that, since data is already broken down by city blocks and the British population is not all that mobile, it would be possible to reassess the 1971 census to suit the new boundaries.

Privacy critics, such as the National Council for Civil Liberties, claimed the proposed midterm census (the first ever) would be more an invasion of privacy than the much-criticized 1971 census.

Error Takes 100 Years Off Centenarian's Life

INGLEWOOD, Calif. – The computer system at the California Department of Motor Vehicles accepted the myth that women lie about their age, but with a new twist – it didn't believe a woman was as old as she claimed.

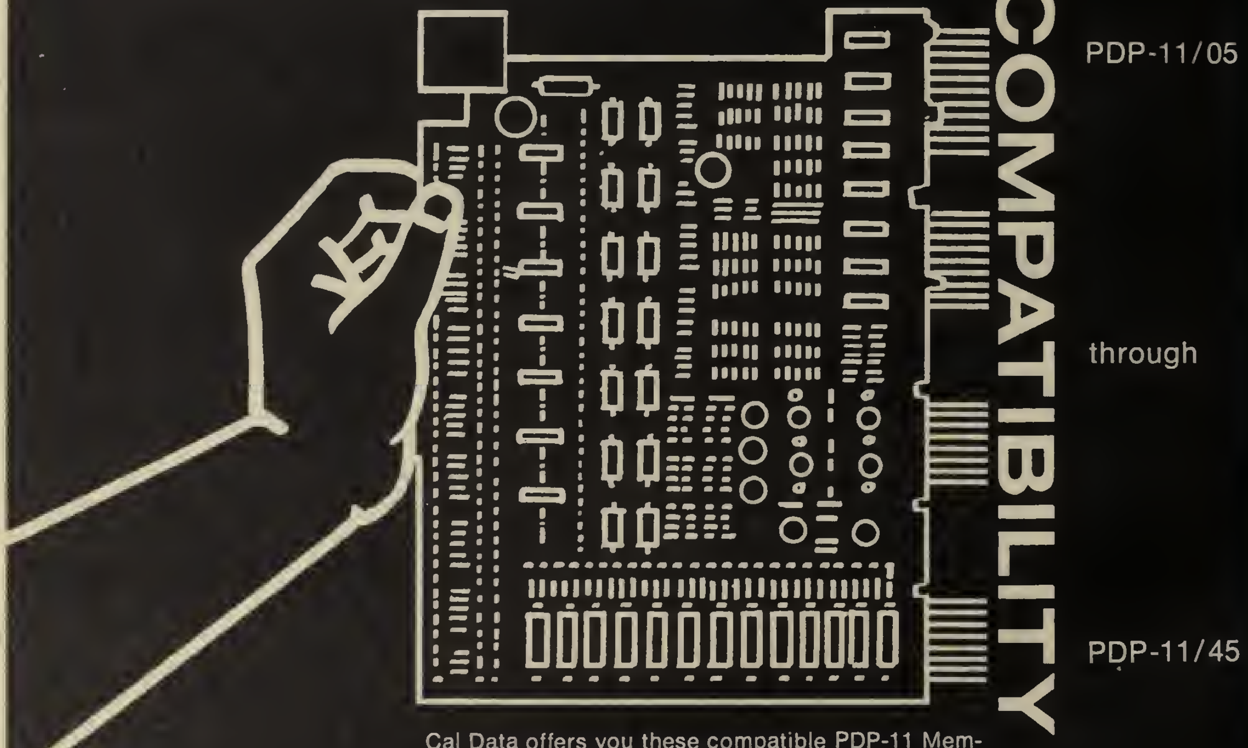
Maude G. Tull's license renewal application was rejected by the system when the birth date was shown as "2-3-72." Licenses are not issued to three-year-olds.

Keying Error Assumed

It was first assumed by the department that a keypunch operator had made the wrong entry when recording the date.

But a check of the original application showed Tull was born February 3, 1872 and the system had interpreted the "72" on the application to mean 1972.

The error was corrected and Tull was issued a one-year limited term license, making her one of the 10 oldest licensed drivers in California.



CI Notes

IBM Calls Off Neotec Buy

ARMONK, N.Y. – IBM has called off the proposed acquisition of Neotec, Inc.

The firm said it will not exercise the option granted by Neotec to purchase patents and other intangible property rights, inventory and receivables related to certain analytical instruments.

Neotec announced revised unaudited results for the year ended Jan. 31 showing a loss of $2.2 million compared with the preliminary $771,000 loss. Revenues were revised downward to $3.3 million from $3.7 million.

The revision gives effect to write-downs of inventory, creation of reserves and other year-end adjustments, Neotec said.

Neotec acknowledged it has a substantial working capital deficit and plans to meet soon with major creditors to consider refinancing, sales of certain assets and other possible courses of action.

Data 100 May Acquire Iomec

MINNEAPOLIS – Data 100 Corp. is holding discussions about acquiring Iomec, Inc., a Santa Clara, Calif., maker of minicomputer peripheral equipment.

Terms have not yet been drawn up, according to a Data 100 spokesman who would say only that "the acquisition could put the company two to three years down the pike in product planning."

Further developments are expected in two weeks.

Iomec, a seven-year-old privately held company, produces a line of peripheral products, including magnetic tapes, disk drives, card readers, paper tape products and a portable data collection device known as the Portaverter, used for inventory control in retail stores.

Based here, Data 100 is a manufacturer or remote batch computer terminal systems. Data 100 operates in the U.S., Canada and nine European and Pacific area countries.

HP to Triple Idaho Plant

BOISE, Idaho – Hewlett-Packard Co. (HP) plans to more than triple the size of its computer products manufacturing operations here by mid-1976, President William R. Hewlett said.

The Boise division designs, manufactures and markets line printers, tape drives and a portion of HP's terminal line.

Univac Orders Calcomp 8440s

ANAHEIM, Calif. – Univac has ordered $2 million worth of Model 8440 disk drives from California Computer Products, Inc. (Calcomp).

Deliveries of the 116M-byte drives are scheduled for this summer.

Although SNA Presents Hurdle

Terminal Mart to Gain 16% Yearly: ADL

By Molly Upton
Of the CW Staff

CAMBRIDGE, Mass. – A recent report on terminals from Arthur D. Little, Inc. (ADL) contained both good and bad news for that segment of the computer industry.

The good news was that the total market will grow at an annual rate of 16% or 17% for the next five years, with domestic shipments of terminals more than doubling by 1980.

Shipments of terminals will reach nearly $3 billion annually in 1980, up from $1.3 billion in 1975.

But terminal suppliers will not retain their current share of the pie, although shipments will continue to grow.

As Systems Network Architecture (SNA), espoused by IBM, and other similar concepts by other mainframers become reality, it will be "more difficult for the independent to claim to a user that he can be both hardware- and software-compatible with a full distributed operating system," Roy M. Salzman, head of ADL's information system planning services, said.

"One can go beyond SNA, currently a concept, to see that IBM or anyone else putting forth that same kind of theory can say, 'Only our hardware can execute our software which is tying these terminals into the market,'' he said.

The need to have the software used by terminals compatible with the rest of the system makes it more likely that companies supplying a full product line will capture an increasing share of the market, he said.

"There will be a good deal of jockeying for competitive advantage and some of the weaker independents are headed for trouble," he added.

"Independent producers will have to assess their alternatives and develop specific market strategies to survive the '70s," Salzman observed.

"Knowledge of customer applications and new software skills, as well as microprocessor design capability, will determine the success with which an independent competes against mainframe and minicomputer systems manufacturers," he said.

By 1981, there will be three million terminals installed, more than three times the current number. They will account for 25% of total computer system value as opposed to 10% in 1974, the study said.

There will be different growth rates in different segments of the terminal market, the study noted.

Shipments of general-purpose terminals, such as keyboard/printers and visual displays, will double in the next five years, but shipments of special-purpose terminals, such as banking teller and point-of-sale units, will triple, moving them from 14% to 30% of all installed units.

Within the general-purpose area, ADL observed, the intelligent terminal systems controllers are the products with the most promise. These control more than one terminal and are user-programmable. They usually have a mini or powerful micro, a 1M-byte disk, batch printer and up to 16 CRTs and/or serial printers, Salzburg noted.

These should reach 18% of all terminal shipments by 1980.

But the intelligent terminal systems controller market is becoming crowded. Key-to-disk makers, remote batch suppliers, Sanders- and Raytheon-type products are all "zeroing in on this product category. Hopefully, the collision course will not result in too many casualties," Salzman said.

Other routes by which suppliers may attempt to avert the SNA hurdle and impending threat of lockout include going off-line to the turnkey small business system area and specializing in products designed for specific industries, he said.

NYSE Brings Ticker Network Up After Eight-Month Pilot Test

By Nancy French
Of the CW Staff

NEW YORK – The New York Stock Exchange's (NYSE) Consolidated Tape, which ran in a limited test program from October through May of this year, went into operation last week with few difficulties reported at press time.

Only Tape A, the current NYSE ticker network, was brought up following an eight-month pilot program in which consolidated transactions in 15 stocks were reported. Four regional stock exchanges, as well as some members of the National Association of Securities Dealers (NASD), participated with the NYSE in the test.

A second Consolidated Tape – Tape B, which will use the current American Stock Exchange ticker network – will not be put into operation until the fourth quarter of the year, according to Frank Palamara, executive vice-president of the NYSE.

A high-speed transmission line, designed to speed reporting for commercial quote vendors and news services that receive stock prices via computer, will be introduced about the same time.

Despite delays reported for the past year, a spokesman for the Securities Industry Automation Corp. (Siac), said both Tape B and the high-speed transmission line are part of "a phased implementation" and are currently on schedule.

"The software for the transmission line is in final stages of testing and debugging," he explained. "The system must then undergo tests with participating recipients."

More than 2,000 NYSE-listed common and preferred stocks, long-term warrants, rights and preferred stocks are now being reported on Tape A daily from 10 a.m. until 4 p.m., trading hours for the NYSE. The tape will eventually operate until 5:30 p.m. Eastern Standard Time, closing time for the Pacific Exchange.

Included in the expanded Consolidatea Tape are the Midwest, Pacific, Cincinnati and Philadelphia-Baltimore-Washington (PBW) stock exchanges, as well as over-the-counter dealers supervised by the NASD and Instinet, an electronic system used by institutions that trade directly among themselves.

The Boston and Detroit stock exchanges will be added before the end of the summer, a spokesman said.

Under the new system, all NYSE tape displays, including wall-mounted devices, CRTs and printing tickers, are receiving Tape A without adjustment at the rate of 900 char./min. Trades from markets other than the NYSE are being identified as in the pilot; with an ampersand following the stock symbol and another character identifying the originating market (e.g., GO&P for Gulf Oil, entered from the Pacific Exchange).

All trades reports on the Consolidated Tape that carry no market designation are from the NYSE.

Over the long term, the Consolidated Tape will add from 15% to 20% more transactions to the present NYSE ticker tape, with somewhat more extensive delays expected on days with large numbers of transactions, according to the spokesman.

Previous tape delays, which ranged from one to four minutes, may increase to about five, he estimated.

If trading in a particular security is halted on the NYSE trading floor for regulatory reasons and trading in that security continues elsewhere, reports from markets still trading will not be displayed on the tape as they occur. Instead, they will be stored and displayed in a group after the market closes.

(Continued on Page 35)

SDS Confident of Profitability as Bookings Increase

By Molly Upton
Of the CW Staff

NASHUA, N.H. – Sanders Data Systems, Inc. (SDS) is moving in the right direction toward profitability, according to Joel Kosheff, vice-president of finance for parent Sanders Associates, Inc.

"We're bullish," said John Nisbet, vice-president of marketing for SDS. "We're quite confident we can meet our goal of $13 million in international bookings and $36 million to $37 million in domestic bookings in 1976."

Nisbet said he is confident SDS will cross the line into profitability in the coming year.

Bookings have been increasing on a monthly basis, he said, noting the first week of June brought in $2 million in orders compared with $3 million for all of May. This rate is well ahead of plan for the end of the year, according to Paul McNamara, SDS national sales manager.

SDS' customer base has been growing, Nisbet said. "Over the past three years, we have literally lived off that loyal customer base" with add-ons, enhancements, etc. Within the last month, however, there were 10 new customers out of 18 orders.

"An amazing number of new accounts are on long-term leases, and that's the type of business we want," he added.

Many of SDS' 8170s installed currently are single systems for comparison, and thus may represent large market potential, McNamara said.

Most of SDS activities are million-dollar opportunities with enhancements, he added, and salesmen currently average $1 million a year in sales.

Progress Being Made

SDS' six-month revenues for the period ended Jan. 31 rose to $14.5 million compared with $10.1 million in the year-ago period, which Kosheff attributed in part to a higher proportion of sales to leases.

The loss for the division stood at $3.2 million compared with a loss of $2 million last year. However, on a pro forma basis, the loss last year was $5.1 million because of a change in accounting and a write-off of $19.2 million taken by the parent firm, he said.

The write-off occurred when, as a reaction to IBM's refusal to support 2260-type equipment, Sanders customers returned much of the installed lease base.

Until that time, Kosheff said, the lease return was very nominal. In the seventh year of the product line, he said, demand for Sanders' units was in excess of returns, and the firm was still manufacturing new units.

McNamara said he expects $24 million in U.S. bookings this fiscal year and expects somewhat under $40 million in 1976 bookings. Over 150 of the 8170 systems have been installed in the past nine months.

In 1976 SDS plans to open five new sales offices, increasing its total field marketing staff to 125 from the current 90.

About 50% of those 1976 bookings will be in purchase or long-term lease-purchase equivalents, he said.

Nesbit explained the recent marketing reorganization as a part of a thrust to become more marketing-oriented. In the move, Sanders placed its domestic and international marketing staff under one group, along with marketing support and customer service.

Sanders sees marketing as a matter of support, he said.

International Scope Necessary

On the international scene, Geoffrey Meadowcroft, recently named vice-president of international operations, said the Sanders product line fits in with the needs of multinational companies, necessitating the international scope of the firm.

Orders are frequently generated by a U.S.-based firm installing Sanders equipment abroad as well as at home, and sometimes the situation reverses, he said.

Meadowcroft said his personal objective is to make the international business sector of SDS as big as the domestic one in three to five years.

In fiscal 1976, he is aiming for $13.5 million in revenues, of which about half, or $5 million, will come from distributors, he said.

Sanders has wholly owned subsidiaries in the UK and Germany and uses distributors in other areas.

New markets can be penetrated more quickly with distributors for less cash on the front end, although in the long run profit margins are reduced, Arthur Carroll, group vice-president of SDS, said.

Sanders has selected distributors within the last year in Italy, Spain, Venezuela, Japan, Austria and New Zealand and also has one in Denmark, he said. There is a support group in London as well as in Nashua, Meadowcroft said.

In the UK, he said, the Model 800 terminal had a quicker surge of popularity because there was not an entrenched IBM 2260-type base there. SDS currently has about 80 customers at 150 sites in the UK. Many of the 8171 users in the UK are converting their machines to purchase agreements, he said.

Except for IBM, Sanders has encountered no other consistent competitor abroad, Meadowcroft said.

In the hierarchy of SDS, software development is on an equal footing with the Data Products Group in order to reflect the increasing importance of software to the product line, Carroll explained. Both U.S. and international marketing come under the heading of the Marketing Division, along with marketing support and customer service. Field service and staff are the remaining two categories.

SDS has increased its research and development expenditures this year over last, and the portion allocated to software is larger than hardware, Nisbet said.

Sanders wants to be known as being in the systems business rather than simply a terminal supplier, Jerome Carp, manager of market support, said.

Carroll said there are currently 6,000 of its 700 series units shipped, of which 3,500 are on lease or under maintenance contract in the U.S.

In the U.S., Sanders has about 1,400 installation sites and more than 12,000 units under Sanders maintenance in the field, he added.

SDS has cut its employment from between 1,200 and 1,300 a year or so ago to just under 900, Carroll said.

Manufacturing, currently with half the number of people, is twice as productive as a few years ago, he said.

FASB Puts Limits on Deferrals Of Development-Stage Firms

STAMFORD, Conn. – Enterprises in the development stage will be required to follow the same accounting principles as established firms, according to Statement No. 7 issued by the Financial Accounting Standards Board (FASB), a group that sets accounting principles.

Prior to this latest ruling, which is effective for fiscal periods beginning on or after Jan. 1, 1976, with earlier application encouraged, firms in the development stage had been permitted to defer all types of costs without regard to their recoverability.

A development-stage firm is defined by the FASB as one that devotes substantially all of its efforts to establishing a new business and either has not begun its planned principal operations or has started such operations, but has not had significant revenues from them.

Generally accepted accounting principles that apply to established operating enterprises will govern the recognition of revenue by a development-stage enterprise and determine whether a cost incurred is to be charged to expense when incurred or is to be capitalized or deferred, the board said.

Development-stage enterprises will be required to disclose additional information, with the income statement and statement of changes in financial position showing cumulative amounts from the founding of the company as well as amounts for each period covered by statements.

In addition, the statement of stockholders' equity must provide specified disclosures about each issuance of equity securities.

Financial statements will be identified as those of a development-stage enterprise and include a description of the nature of the development-stage activities in which the enterprise is involved.

Intel Fields Own Force

SUNNYVALE, Calif. – In its first step into the end-user market, Intel Corp. is selling its IBM 370 add-on memories through its own sales force, according to Richard Egan, assistant general manager of Intel's Memory Systems Division.

The firm is continuing to supply memories to Computer Investors Group, Inc. and Itel Corp., he said.

By fielding a force of 10 salesmen in eight cities, Intel hopes to gain on-site feedback on possible new product areas, he said.

"We are building a large IBM business which represents a significant area of growth for the division," he said. "We need marketing forecasts in order to better control our market and our growth."

Intel makes semiconductor memories up to 512K for the 370/135, up to 2M bytes for the 145 and up to 8M bytes for the 158, which uses a 4K chip, he said. A larger memory for the 135 is seen as the next new product.

Intel also makes a memory for the 155, but that is in limited production he said.

Maintenance will be provided by Intel's own technical support and third-party maintenance organizations, Egan said.

The Intel division also makes OEM memories for a number of computer makers as well as terminal suppliers in both the U.S. and Europe, he said.

NYSE Brings Net Up

(Continued from Page 33)

ing in a particular security is halted or its opening is delayed on the NYSE floor, reports from other markets will continue to be displayed on the tape.

Reports from other markets will also be displayed if the NYSE trading floor is forced to close because of a local problem such as a transit strike or a snowfall that may not affect Siac 24-hour computer operation.

The Consolidated Tape is being generated by Siac's dual-IBM 360/50 system with 1M byte of core.

CPUs in the regional exchanges feed data into the central computer system via 2,400 bit/sec full-duplex data circuits.

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In DEC's Quest for Market

Birth of Classic Takes Different Path

MAYNARD, Mass. – With the cost of computing power decreasing, the market for systems is increasing. And going after that market requires a somewhat specialized, different approach, which the Digital Equipment Corp. education group has embodied in its Classic system.

Classic, borne of the idea of making a system the uninitiated person can readily accept and use, emerged based on the PDP-8/A.

The development of the Classic took a somewhat different and extremely quick path through the maze of the Maynard mill here.

The specifications, centered around marketing considerations that it be "human-engineered" and low-cost, were given to the engineering group, which was then challenged to meet them, said Charlie Spector, group manager of education and engineering.

The Classic was given the go-ahead by management Sept. 16, 1974 and the first production unit was shipped in May.

The primary requirement for the system, which has two buttons to turn it on and bring the system up, was that the cost/student terminal hour be about half that of using a time-sharing system, either in-house or outside, he said.

The other requirements were ease of use and reliability, Spector said.

A Classic sells for about $7,900 and a curriculum package, including slides, 96 books and eight floppy disks, costs $395.

Components of the Classic consist of the specially developed PDP-8/A with 16K words of core, a VT 50 CRT and electrostatic hard-copy device as well as dual floppy disks and keyboard.

DEC manufactures all components, Spector said.

Eventually, the Classic will have semiconductor memory, when the economic crossover point is reached for 16K memory, he said.

The Classic is a "single-user" system, with only one terminal. If an institution needs three or four terminals, buying that many Classics offers price advantage over a multiterminal system. At about five or seven terminals, the crossover point is reached, he said.

The market reception to the Classic is as expected, Spector said. DEC expects to meet projections this quarter for Classic shipments and will get more aggressive in the next fiscal year starting July, he added. Most of the orders – 70% – have been from first-time users, he said.

Looking at the long term, Spector sees the market for this type of machine expanding.

Eventually, all high school graduates will have computer familiarity, and the number of students and the decreasing price curve will meld into a market of one system per student, he said.

CW Photo by M. Upton

Gary Miller demonstrates Classic system.

There has been considerable interest in the system from advanced institutions wishing to use the system as a "brilliant" terminal as well as a stand-alone system, he said.

These institutions tend to use the system's Fortran IV option, whereas the machine's curriculum packages are designed to use Basic.

The Classic sells for about half the cost of a sophisticated programmable calculator, Spector noted, adding the Classic had outperformed such machines on even simple functions.

At the school level, the Classic offers a price opportunity, or low-entry system cost. For more advanced institutions that already have some type of computing capability, the Classic represents a price break, he said.

"The PDP-8 has an historically elegant instruction set," said Spector, explaining that an operator could do a lot with one instruction. The PDP-11, by contrast, is more flexible, but also needs more instructions.

Sales of the Classic have not appeared to cut into sales of the smaller 11s, he said, explaining the market grows as the price drops.

To overcome what Spector calls "teacher resistance," or reluctance to using computers, DEC has had its five-person educational advisory board in on the design of the Classic from the beginning. It offers a one-day teacher education course here and also conducts seminars around the country as well as in Europe.

These are aimed at giving teachers hands-on experience rather than a hard sell, he noted.

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DOCS allows from 1 to 4 3277 display unit consoles to be used simultaneously as SYSLOG devices.

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DOCS permits messages followed by Reads to the typewriter to remain unanswered without tying up the system. All outstanding Reads are shown in high intensity on the display console(s).

REDUCED SUPERVISOR SIZE & OVERHEAD
DOCS does away with any need for the Console Buffering option in DOS thus providing a savings in the core required by DOS as well as reducing overhead within the supervisor.

ELIMINATES DEPENDENCY ON 1052
DOCS will continue to operate, and allow the entire system to operate, if the 1052 typewriter becomes inoperable. DOCS spools all typewriter data to a hard copy disk file for later printing thus obviating the need for the 1052 to be on-line at all times. Hard copy is asynchronously provided if the 1052 is available. A hard copy listing is also available through a utility program which the user may execute in any problem program partition to list the hard copy file on SYSLST.

NO USER PARTITION REQUIREMENT
DOCS executes in its own pseudo-partition thus allowing the user unrestricted use of the problem program partitions.

MULTIPLE EXTERNAL INTERRUPT KEYS
DOCS provides a separate External Interrupt key for each partition (replacing the use of the the MSG command). This is especially convenient for EDOS users. This function also is useful for GRASP users when communicating with a Background partition problem program.

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MSP Sees U.S. as Prime Market

NEWTON, Mass. – The North American market is too big and too well-educated to ignore, according to David Gomes da Costa, managing director of Management Systems and Programming Ltd. (MSP).

Americans are more willing to accept change and new methods of doing things than Europeans, he said, adding this helps make North America a prime target for his firm's offerings of packaged data base software, including a freestanding data dictionary called Datamanager [CW, June 11].

Gomes da Costa is searching for distributors and investigating licensing arrangements, he said.

The systems software market on the international scene will probably be more profitable than applications in a few years, he said, as the need for system portability expands.

Although the applications area will grow significantly, Gomes da Costa noted, the systems area will likely be less crowded and more profitable.

However, he cautioned, the line between applications and systems packages will become increasingly grey.

Of an estimated 2,000 or 3,000 current prospects worldwide for data dictionary software, Gomes da Costa said he would be happy if MSP could get 15% in the next two or three years.

While sales of data base packages seem to be leveling off or dropping, there is still a need for a dictionary, he said.

The bulk of British software houses are body shops, concentrating on contract work, he noted, and few seem inclined to go into production of packages.

There is about a four-year delay on investment return from a package, he noted, and most British firms seem to be either "between a peak and trough of work," and therefore aren't sure about making the investment, or are in the trough and don't have the capital or are too busy.

MSP received a grant from the National Computing Center to aid in development of Datamanager, he said.

He estimated custom software gives the user only about 55% of what he wants at 30% to 40% above the price it would cost to obtain a package.

MSP, he said, is becoming increasingly marketing-oriented and moving away from the body-shop approach. He emphasized his definition of marketing means an easier sale for the firm and making the product easy for the customer to use.

Currently MSP is preparing video materials, as well as extensive documentation for which it uses a minicomputer to prepare crossreferences.

From its one-man start in 1966 with financing of $700, MSP has been profitable every year except 1971, he said. It started out building test tools for IBM operating systems for internal use and sold 40 of these within two years.

In 1971 it came out with an upgraded module testing system, of which it has sold 130 copies in 16 countries. One of the customers is Hitachi, which he suspects is providing the unit on its new M series.

Currently MSP is planning to develop a portable minicomputer Cobol compiler to facilitate the transfer of applications programs from minis to larger mainframes.

UK Software Houses Seek 'Colonies'

By Edith Holmes
Of the CW Staff

NEW YORK – The British came here last week in the form of seven software houses looking to establish "colonies" in the U.S. market.

The firms were participants in a tour sponsored by the British Overseas Trade Board and the Computing Services Association, whose membership covers about 75% of the British computer software and services industry.

From May 25 to June 6, directors of these companies visited manufacturers of systems, software houses and user companies in Washington, D.C., Los Angeles, San Francisco and New York.

The firms, whose products cover personnel and payroll, freight forwarding, commercial real-time systems, high-level languages and productivity consulting, sent representatives on this tour because they believe the U.S. economy is on the upturn.

Stewart Ashton, head of the group of directors and representative of Systems Designers, Ltd., also said the companies came because they believe more effective use can be made of hardware.

"The UK's computer industry has developed differently from that in the U.S.," he stated. "The U.S. seems to have been oriented toward larger equipment, while the UK has developed smaller systems requiring smaller scale software."

He maintained the British software houses have devised generally more compact and higher quality products than those marketed in the U.S. as a result.

"We expect the previous preference for tailored software in the U.S. will change, given our ability to cut development costs by 60% with packages."

Cepa Head Urges National Center To Coordinate Software Efforts

DALLAS – "Substantial savings could be realized annually if a national center were established to coordinate development, dissemination and use of software," said J. Crozier Brown, president of Civil Engineering Program Applications.

Crozier made the statement following a two-year research project which found that, in fiscal 1974, the Federal Government spent more than $21 billion for civil engineering and computer-related activities.

Computer programs or software, approximating $260 million, have been developed and identified as used in support of these expenditures.

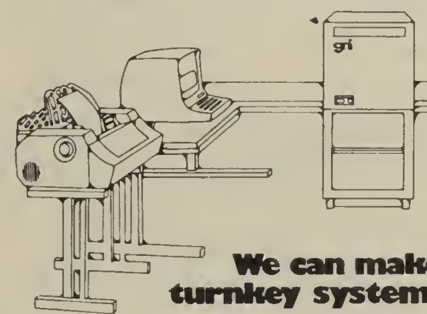
Four major problem areas were indicated by the study.

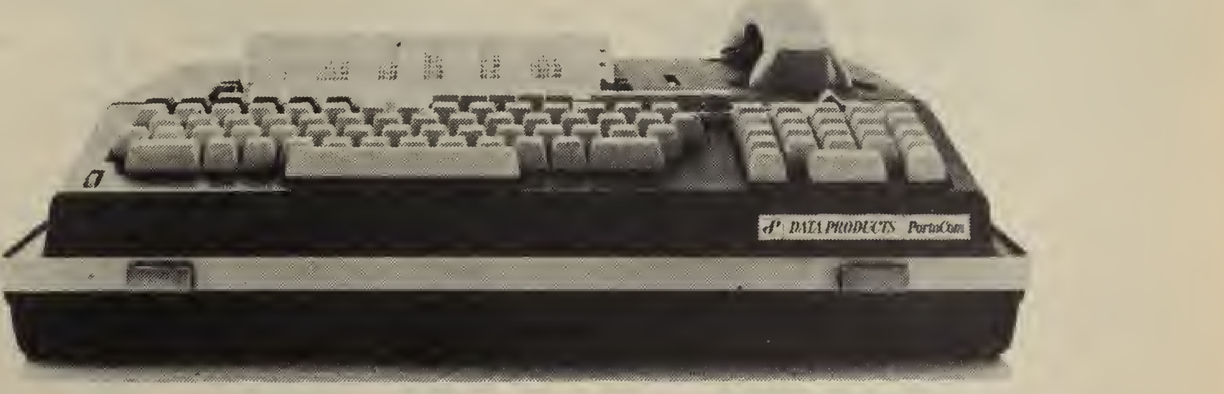
First, no standards exist for the design, coding and documentation of engineering applications software, Brown said, and optimum use of existing resources is not being made.

In addition, there is "no single professionally based contact point available to present or potential users of the computers or software," he noted.

Finally, the study said the full range of computer-oriented educational resources is not available.

"Data also shows that, of the 263,000 civil engineering and architectural professionals in the U.S., an estimated 90% still have a major unfulfilled need for computer software," Brown concluded.





Xerox Closest Competitor

IBM Tops DP Makers in Fortune 500 Listing

NEWTON, Mass. – Not surprisingly, IBM came out way in front of all other computer manufacturers in *Fortune* magazine's annual compilation of the 500 largest industrial corporations, ranking ninth in sales and second in net income.

The closest competitor in terms of sales was Xerox Corp., ranked 41st. IBM's ninth-place slot represented a drop of one place since 1973.

Top places on the Fortune 500 list went to Exxon, General Motors, Ford, Texaco, Mobil Oil, Standard Oil of California, Gulf Oil and General Electric.

Ranked by sales, Singer, Honeywell and Sperry Rand were in a close race, sitting in 66th, 68th and 70th place respectively, all down 12 to 14 places from last year.

NCR placed at 97, down 11 places; Burroughs at 134; Control Data at 187; and Hewlett-Packard at 225, up 16 places.

Further down the list, Cincinnati Milacron made its showing at 373, Digital Equipment at 388 and Bunker Ramo at 467.

DEC Took Biggest Jump

The biggest jump in ranking by sales was DEC's upward move of 87 places; Nashua moved up 67 places to 465.

While IBM ranked only ninth with sales of $12.6 billion, compared with Exxon's $42 billion, *Fortune* ranked the computer manufacturer sixth in terms of assets, ($14 billion), second in net income and third for stockholders' equity.

This variance in ranking between sales and assets was reflected by other computer manufacturers' standings as well. Xerox, for instance, jumped from 41st in sales to 26th when ranked by assets, NCR from 97th to 61st, Burroughs from 134th to 63rd and Control Data from 187th to 72nd.

DEC ranked number 207 in net income and fifth in growth of earnings per share of 41.27% over the 10 years from 1964-1974.

Total returns for all industries for 1973 and 1974 dragged down the results for the 1964-1974 decade, according to *Fortune*, sinking to a low 1.83%.

Five companies, the magazine noted, including Addressograph-Multigraph, Litton, Lockheed, Bunker Ramo and Avco, had average annual negative returns that were close to 20%.

Turning to *Fortune*'s assessment of which companies did best and worst in 1974, the total return to investors' median for all industries was off 22.35%; the office machinery category, however, which includes computers, was down 50.82%.

For the decade 1964-1974, the total return to investors' median for all industries was up 1.83%, but down 6.49% for office machinery.

On the brighter side, sales for the office machinery industry were up 15.4% from last year and profits up 21.5%.

Only two computer industry companies appeared on *Fortune*'s list of "money losers" – Litton Industries, with a loss of $39.5 million, and Singer, with a loss of $10 million.

System to Form Hub of Soviet Plant

The Soviet Union's Kama Auto Works has selected IBM to supply 10 System/7s for process control in its foundry and a 370/158 for management reporting.

The order for the IBM equipment has been passed by the U.S. Department of Commerce to the North Atlantic Treaty Organization (Nato) Coordinating Committee for approval [CW, April 9].

The following article details plans for the IBM equipment as well as other makers' units.

Novosti Press Agency
Special to Computerworld

KAMA RIVER, USSR – An automated management system (AMS) linking nine subsystems designed to handle about 300 tasks forms an integral part of the mammoth Kama Auto Works (Kamaz).

The complex of plants here will have the capacity to produce 150,000 cars and 250,000 diesel engines a year – one automobile every 1.6 minutes and one engine every minute.

The hierarchy of computer systems will cover jobs from management reporting and planning functions for the plants to control of production at all levels.

The Kamaz AMS is being evolved at the same time the plant is being designed. This approach creates certain difficulties and imposes time limits. But it also has an advantage: The first stage of the system will go into operation simultaneously with the works.

This project is one of the early attempts here to build up a coherent DP system for the solution of a large number of related problems.

All design, performance and technoeconomic characteristics have been brought together in a system with a definite structure which should permit an integrated, speedy system.

Interactive Capability

Two third-generation computers installed in the general management office will have interactive capability to provide information on the economic, production and technical performance of the works.

These machines, which will serve as backup for each other, will tackle comprehensive problems such as planning output of trucks, engines and spare parts per year, quarter and month and setting production targets for plants within the complex.

[A spokesman for Kamaz said there will be one management system, the 158, in the immediate future, although plans call for two eventually.]

These machines will determine requirements in materials, components, personnel, equipment, outfit and instruments specified, draw up production schedules on different levels and take stock of output and rejects.

Other tasks will include cost planning and accounting and control of finances and accounting.

On the second level of the hierarchy, somewhat smaller machines will be used for technoeconomic planning, technical provision of production and operational control with respect to the needs of each plant, such as calculation of plans for shops and sections of production per year, quarter, month and so on.

Computers will also be used to control the quality of output, calculate requirements in materials, keep a record of rejects and supply information on defects and employees responsible for them.

Smaller, controlling computers will be used for the management of production, control of the transportation of materials and production processes.

These computers operate in real time and will control operation of conveyors, depots and other production objects.

From the moment a truck frame enters the production line, the controlling computer will monitor its progress up to the stage of marketing.

The CPU must be reliable, quick and interactive. It also must maintain constant contact with the bigger computers which process data on a higher level.

Lehigh Awarded Grant For Retrieval System

BETHLEHEM, Pa. – Lehigh University has received a National Science Foundation (NSF) grant of $200,000 to support ongoing development of a more "intelligent" information storage and retrieval system known as Leadermart.

This was the 12th in a series of such grants dating back to 1962.

The NSF grant will enable the research team to build into Leadermart a logic feature to be known as the Question Answering System (Quansy), capable of performing deductions and drawing limited inferences, or analyzing the questions and deciding what kind of answer is required.

Leadermart, will be capable of providing "data, not just documents . . . facts, not just folios," according to Dr. Donald J. Hillman, director of the university's center for information science.

Aussies Mixing DP Generations

SYDNEY, Aust. – Australians seem to be well into fourth-generation equipment, but still in the second generation of systems, according to a report from the U.S. Department of Commerce.

The information, provided by the American Consul General here, noted that minicomputers are a thriving market downunder.

"There is little local manufacturing in the industry, and local sources estimate over 90%, perhaps as high as 96%, of the total value of computer and component sales were imports from U.S. companies or their overseas subsidiaries" during fiscal 1974, the report stated.

Department figures showed that imports for fiscal 1973, which totaled 4,456 units, were valued at $71.3 million; of that, the U.S. share was $24.6 million or 1,931 units.

In fiscal 1974, 11,102 imported units were valued at $101.5 million with 6,288 U.S. units accounting for $50 million of the total.

A local census found IBM held 23.8% of the installed base, Honeywell 16.2% and ICL 11.2%.

The largest increase in market portion between fiscal 1973 and 1974 was Digital Equipment Corp.'s jump from 9% to its current 11.8%.

UK Drug Firm Gets First 64/20

MORETON, England – The first delivery of a Honeywell Series 60 Level 64 computer was made to E.R. Squibb and Sons Ltd., the UK subsidiary of the American pharmaceutical company.

The medium-scale 64/20 system, valued at about $480,000, was developed and manufactured in France. The system was installed and accepted seven days after delivery, Honeywell said.

The 64/20 is now running all of the company's production work including order processing, accounts payable and receivable, a general ledger/budget control system, inventory control and various small jobs for production departments.

The applications software Squibb used on the 115 can run in "compatible mode" while the 64/20 processes other programs in "native mode," a spokeswoman noted.

The 64/20 will allow Squibb to expand into on-line marketing, accounting, inventory and production control applications.

Squibb's Model 64/20 includes a central processor with 96K of MOS memory, three disk units with 87M bytes of storage, three magnetic tape units, a card reader and belt printer.

GE Division Agrees To Sell Fabri-Tek Unit

MINNEAPOLIS – Fabri-Tek, Inc. and the General Electric Co.'s Installation and Service Engineering Department (GE I&SE) have entered into an agreement under which GE I&SE will sell, install and service, on a nonexclusive basis, Fabri-Tek's drum replacement core memory system for the GE/PAC 4010, 4020 and 4060 process control computers.

The drum replacement core memory is available through both Fabri-Tek's direct sales force and GE I&SE.

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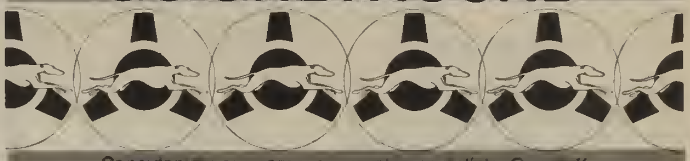

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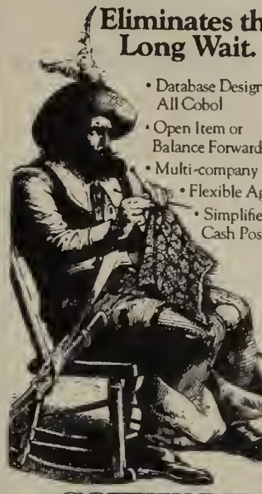

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MAI Earnings Grow 315% in Half Year

NEW YORK – Management Assistance, Inc. (MAI) reported record earnings and revenues for the first half of 1975 despite writing off $1.1 million of payments due from Potter Instrument Co., Inc.

Chairman Raymond P. Kurshan said he expects 1975 income and revenues will surpass last year's record results.

Earnings for the six months rose 315% to $2.1 million or 7 cents a share compared with $512,000 or 2 cents a share.

The 1975 figures include a special charge of $592,000 for the Potter write-off net of tax benefit and a tax credit of $702,000. During the 1974 period, the tax credit was $474,000.

Revenues rose 25% to $44.8 million compared with $35.9 million in the year-ago period.

During the quarter, earnings rose 51% to $564,000 or 2 cents a share compared with $373,000 or 1 cent a share; revenues climbed 19% to $21.9 million compared with $18.5 million in the year-ago period.

Equipment sales revenues, including sales of the Basic/Four system, accounted for $9.1 million during the quarter compared with $7.1 million a year ago. In the six months, sales totaled $19.3 million compared with $12.7 million in the same 1974 period.

Revenues Rise While Earnings Slip In Graham Magnetics' Nine Months

GRAHAM, Texas – Tapemaker Graham Magnetics, Inc. reported increased nine-month sales but lower earnings compared with a year ago.

Earnings slipped to $830,793 or 88 cents a share compared with $920,154 or 98 cents a share in the same 1974 period.

Revenues grew to $11.9 million compared with $11.2 million in the same quarter last year.

The decrease in earnings, which were second only to the nine-months earnings last year, was "affected by the rising costs of petroleum-derived materials," according to G.A. Jaggers, Graham president.

"Our nine-month earnings are not considered as indicating a trend. New products are expected soon to push sales higher, with accompanying impact on earnings," he added.

Sycor Results Up

ANN ARBOR, Mich. – Sycor, Inc's earnings and revenues increased for the first quarter ended March 31.

Earnings rose to $1.2 million or 44 cents a share compared with $853,000 or 31 cents a share in the year-ago period.

Revenues grew 20% to $11.2 million compared with $9.3 million.

Substantially all of the increase in revenues stemmed from penetration of the market in the U.S. and Canada, which generated the growth of revenues from equipment on lease, said Samuel N. Irwin, chairman and president.

Greyhound Net Down Though Revenues Peak

PHOENIX – Despite record first-quarter revenues, Greyhound Computer Corp.'s earnings declined to $49,000 or 1 cent a share compared with $438,000 or 10 cents a share in the year-ago period.

Revenues grew to $15.8 million compared with $12.8 million a year ago.

The decline in earnings was primarily attributable to disappointing data services results and the continuing decline in computer leasing results, which more than offset the contribution of the acquisition in December of Computer Leasing Co., according to Olie E. Swanky, Greyhound president.

Itel on Target

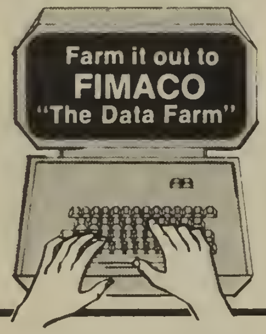
SAN FRANCISCO – Undeterred by the lack of special credit, Itel Corp.'s first-quarter earnings exceeded those of the year-ago period, with a performance "that is on target with management's expectations," according to Peter S. Redfield, president.

Revenues rose to $38.2 million compared with $29.4 million in the year-ago period while earnings increased to $2.1 million or 22 cents a share.

This compares with $2.07 million or 21 cents a share in the year-ago period, when there was a $150,000 tax credit.

Executive Corner

- Jack N. Air has been named vice-president of Forsythe/McArthur Associates, Inc.
- Robert M. Caughey has been named vice-president of Applied Data Research.
- Richard B. Hillery has been named president of Gambles Datamation Center.
- W. William Acker has been named executive vice-president and elected a member of the board of directors of ADL Systems, Inc.
- Dan L. McGurk and Robert J. Moore have been elected to the board of directors of Inforex, Inc.
- Ronald J. Davis has been appointed group vice-president of Applied Data Research.
- Thomas J. Connors has been named president of Micro, Inc.
- Anthony Pintauro has been named vice-president of marketing at DPF, Inc. following the resignation of Michael Creedon. In addition, Barry Korn has been named treasurer and Kenneth Endick has been named secretary and general counsel for the company.
- Lawrence A. Lotito has been named vice-president of market development at Varian Data Machines.
- Mark L. Siegel has been named vice-president of the Memory Product Division of Diablo Systems, Inc.
- William E. McKenna has been elected to the board of directors of Mohawk Data Sciences Corp.
- Glenn F. Schafer has been named manager of programming services; Curt Huff has been appointed assistant vice-president and manager of operations; and Clark D. Karcher has been named vice-president of marketing at Rapidata, Inc.
- Thomas O. Harbison has been named president and chief operating officer of Genesis One Computer Corp.
- N.H. Hawkins has been appointed vice-president and general manager for the Data Communications Division of GTE Information Systems, Inc.
- Oliver Williams has been appointed vice-president of manufacturing at John Peers & Co.
- Ralph C. Batastini has been named chairman of the board; Robert W. Bertrand, Robert E. Dell'Artino and Bernard A. Roth have been appointed executive vice-presidents of administration, marketing and finance, respectively; and Walter L. Crowley has been named senior vice-president of Greyhound Leasing & Financial Corp.
- Joseph R. Leonardi has been appointed a vice-president of Inforex, Inc.



Earnings Reports

REDACTRON
Three Months Ended March 31

	1975	1974
Shr Ernd	.....	$.24
Revenue	$4,299,914	4,515,723
Tax Cred	.....	137,000
Earnings	(997,132)	274,516
9 Mo Rev	14,834,494	11,313,751
Loss	868,389	88,809

INFOREX
Three Months Ended March 28

	1975	1974
Shr Ernd	$.04	.....
Revenue	13,146,000	$10,798,000
Tax Cred	58,000	.....
Earnings	116,000	(92,000)

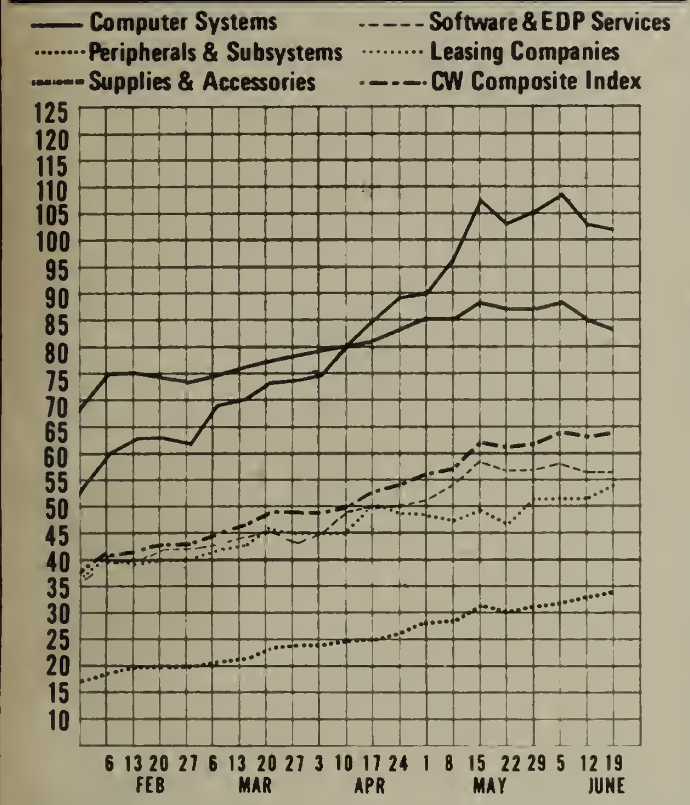
DATATAB
Three Months Ended March 31

	1975	1974
Shr Ernd	.....	$.07
Revenue	$1,158,046	1,252,440
Earnings	1,463	51,694

MSI DATA
Year Ended March 29

	1975	1974
Shr Ernd	$.64	$.59
Revenue	33,486,874	20,188,353
Spec Cred	a99,985	.....
Earnings	1,249,076	1,158,775

a-From cumulative effect of a change in accounting.


COMPUTERWORLD Computer Stocks Trading Indexes

INFORMATION MAGNETICS
Year Ended Dec. 29

	1974	1973
Shr Ernd	.....	$.55
Revenue	$21,640,000	19,278,000
Earnings	(2,893,000)	709,000

Three Months Ended March 29

Shr Ernd	.41	.13
Revenue	5,631,000	5,092,000
Tax Cred	246,000	.....
Earnings	515,000	162,000

MANAGEMENT ASSISTANCE
Three Months Ended March 31

	1975	1974
Shr Ernd	$.02	$.01
Revenue	21,910,000	18,465,000
Spec Item	a(383,000)	b293,000
Earnings	564,000	373,000
6 Mo Shr	.07	.02
Revenue	44,795,000	35,859,000
Spec Cred	c110,000	b474,000
Earnings	2,128,000	512,000

a-Consists of $592,000 from write-off of settlement agreement and $209,000 from a tax-loss carryforward credit. b-Credit from tax-loss carryforward. c-Consists of $702,000 from a tax-loss carryforward credit and $592,000 from write-off of settlement agreement.

RELIANCE GROUP
Three Months Ended March 31

	1975	a1974
Shr Ernd	$.15	$.42
Revenue	209,745,000	185,516,000
Disc Op	.....	135,000
Tax Cred	1,944,000	.....
Earnings	3,190,000	6,180,000

a-Restated for discontinued operations.

SANDERS ASSOCIATES
Three Months Ended April 25

	a1975	1974
Shr Ernd	$2.91	$.17
Revenue	48,938,000	41,826,000
Spec Cred	b12,956,000	308,000
Earnings	13,290,000	773,000
9 Mo Shr	$3.15	.64
Revenue	129,335,000	120,547,000
Spec Cred	b13,222,000	c1,146,000
Earnings	14,399,000	2,923,000

a-Reflects a change in accounting estimate for lease acquisition and other marketing and administrative costs effective in the fourth quarter of fiscal 1974. b-Includes credit for debenture exchange of $7.9 million and tax-loss carryforward. c-Tax-loss carryforward.

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Neal Wilder
Sales Administrator:
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TRADE*QUOTES

Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, JUNE 18, 1975

All statistics compiled, computed and formatted by
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Cambridge, Mass. 02139

COMPUTER SYSTEMS

EXCH		PRICE 1975 RANGE (1)	CLOSE JUN 18 1975	WEEK NET CHNGE	WEEK PCT CHNGE
N	BURROUGHS CORP	62-108	99 1/4	+ 1/8	+0.1
O	COMPUTER AUTOMATION	2- 9	7	+ 1/4	+3.7
N	CONTROL OATA CORP	11- 23	21 1/4	+ 3/4	+3.6
N	DATA GENERAL CORP	10- 33	27 1/4	- 3/4	-2.6
O	OATAPOINT CORP	6- 25	18 1/4	-1 1/4	-6.4
O	DIGITAL COMP CONTROL	1- 4	3	- 3/4	-20.0
N	DIGITAL EQUIPMENT	46-111	100 3/8	+ 1/2	+0.5
N	ELECTRONIC ASSOC.	2- 3	3	0	0.0
A	ELECTRONIC ENGINEER.	5- 10	9 5/8	+ 1/2	+5.4
N	FOXBORO	23- 37	35 3/4	+ 3/8	+1.0
O	GENERAL AUTOMATION	6- 11	8 1/2	+ 3/4	+9.6
O	GRI COMRUTER CORP	1- 1	1/2	- 1/8	-20.0
N	HEWLETT-RACKARD CO	58-117	110	- 5/8	-0.5
N	HONEYWELL INC	22- 40	37 3/4	+ 7/8	+2.3
N	IBM	159-224	204 1/4	-6	-2.8
O	MEMOREX	1- 10	7 7/8	+ 1/4	+3.2
O	MICROOATA CORP	2- 4	3 3/8	+ 1/4	+8.0
O	MODULAR COMPUTER SYS	5- 18	15 1/4	+1 1/2	+10.9
N	NCR	15- 39	37 1/2	+ 1/4	+0.6
N	RERKIN-ELMER	16- 29	25	0	0.0
N	RAYTHEON CO	26- 55	54 1/2	- 1/4	-0.4
N	SINGER COMPANY	10- 17	15 1/4	- 1/2	-3.1
N	SPERRY RAND	26- 47	42 1/4	-2 3/8	-5.3
A	SYSTEMS ENG. LABS	1- 4	3 3/4	+ 5/8	+20.0
O	ULTIMACC SYSTEMS INC	1- 6	5 1/2	- 1/2	-8.3
N	VARIAN ASSOCIATES	7- 12	10 1/2	- 1/2	-4.5
N	WANG LABS.	7- 15	13 5/8	- 3/8	-2.6
N	XEROX CORP	51- 86	66 3/8	-3 1/8	-4.4

LEASING COMPANIES

EXCH		PRICE 1975 RANGE (1)	CLOSE JUN 18 1975	WEEK NET CHNGE	WEEK PCT CHNGE
O	COMOISCO INC	1- 5	4 1/4	+ 1/4	+6.2
A	COMMERCE GROUP CORP	2- 4	3	+ 1/4	+9.0
A	COMPUTER INVSTRS GRP	1- 2	1 1/4	+ 3/8	+42.8
M	OATRONIC RENTAL	1- 1	1/2	+ 1/8	+33.3
A	OCL INC	1- 1	1/2	-	-9.9
N	OPF INC	3- 5	4 7/8	- 1/2	-9.3
O	EOP RESOURCES	2- 2	2	0	0.0
A	GRANITE MGT	1- 5	4 3/8	- 1/8	-2.7
A	GREYHOUNO COMPUTER	2- 3	3 3/8	+ 1/4	+8.0
A	ITEL	3- 8	7 1/8	+ 3/8	+5.5
N	LEASCO CORP	4- 8	6	+ 1/2	+9.0
O	LEASPAC CORP	1- 1	1/4	0	0.0
O	LECTRO MGT INC	1- 1	1/8	0	0.0
O	NRG INC	1- 4	3 3/8	+ 1/2	+17.3
A	PIONEER TEX CORP	2- 5	4 1/4	0	0.0
A	ROCKWOOO COMPUTER	1- 1	5/8	0	0.0
N	U.S. LEASING	9- 14	9 7/8	- 3/8	-3.6

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
O-T-C PRICES ARE BID RRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

SOFTWARE & EOP SERVICES

EXCH		PRICE 1975 RANGE (1)	CLOSE JUN 18 1975	WEEK NET CHNGE	WEEK PCT CHNGE
O	AOVANCED COMP TECH	1- 1	7/8	- 1/8	-12.5
A	APPLIED OATA RES.	1- 10	2 5/8	+ 1/8	+5.0
N	AUTOMATIC OATA PROC	29- 62	55 3/8	-2 1/4	-3.9
O	BRANDON APPLIEO SYST	1- 1	1/8	0	0.0
O	CENTRAL DATA SYSTEMS	3- 3	3	- 1/4	-7.6
O	COMPUTER DIMENSIONS	2- 6	5 1/2	- 1/8	-2.2
O	COMP ELECTION SYSTMS	3- 6	5 1/8	- 3/8	-6.8
O	COMPUTER HORIZONS	1- 1	3/4	0	0.0
O	COMRUTER NETWORK	1- 2	1 7/8	- 1/8	-6.2
N	COMPUTER SCIENCES	2- 6	5 7/8	- 1/8	-2.0
O	COMRUTER TASK GROUP	1- 1	3/4	0	0.0
O	COMPUTER USAGE	2- 4	2 5/8	+ 1/8	+5.0
O	COMSHARE	3- 4	3 5/8	+ 1/8	+3.5
O	OATATAB	1- 1	1 1/4	+ 1/8	+11.1
A	ELECT COMR PROG	1- 1	1/4	0	0.0
N	ELECTRONIC OATA SYS.	12- 28	21	+1 1/2	+7.6
O	INFONATIONAL INC	1- 1	1/8	0	0.0
O	IPS COMPUTER MARKET.	1- 1	1/2	- 1/4	-33.3
O	KEANE ASSOCIATES	2- 3	2	0	0.0
O	KEYOATA CORR	2- 3	2 7/8	+ 1/8	+4.5
O	LOGICON	3- 5	4	0	0.0
A	MANAGEMENT OATA	1- 3	2 1/8	- 1/4	-10.5
O	NATIONAL CSS INC	6- 14	11 1/2	+ 1/2	+4.5
O	NATIONAL COMPUTER CO	1- 1	1/8	0	0.0
A	ON LINE SYSTEMS INC	8- 14	12 7/8	-1	-7.2
N	PLANNING RESEARCH	2- 5	4 5/8	- 1/8	-2.6
O	PROGRAMMING & SYS	1- 1	3/4	0	0.0
O	RAPIOATA INC	2- 5	4 7/8	+1 5/8	+50.0
O	SCIENTIFIC COMPUTERS	1- 1	1	0	0.0
O	SIMPLICITY COMPUTER	1- 1	1/4	0	0.0
O	TYMSHARE INC	7- 20	18 1/2	+1 1/4	+7.2
A	URS SYSTEMS	2- 3	2 1/2	- 1/4	-9.0
N	WYLY CORP	2- 4	3	0	0.0

PERIPHERALS & SUBSYSTEMS

EXCH		PRICE 1975 RANGE (1)	CLOSE JUN 18 1975	WEEK NET CHNGE	WEEK PCT CHNGE
N	ADDRESSOGRAPH-MULT	4- 9	7 7/8	- 1/8	-1.5
O	ADVANCEO MEMORY SYS	1- 6	5 3/8	+ 1/8	+2.3
N	AMPEX CORP	3- 7	5 7/8	- 1/4	-4.0
O	ANDERSON JACOBSON	1- 3	2 3/4	+ 1/4	+10.0
O	BEEHIVE MEDICAL ELEC	1- 5	4 1/2	0	0.0
A	BOLT,BERANEK & NEW	5- 9	8 1/2	+1 1/8	+15.2
N	BUNKER-RAMO	4- 7	7	+ 5/8	+9.8
A	CALCOMP	4- 7	5 3/4	0	0.0
O	CAMBRIOGE MEMORIES	3- 5	4 1/2	- 1/8	-2.7
N	CENTRONICS OATA COMP	7- 22	18 1/4	-1 3/8	-7.0
O	CODEX CORR	15- 38	33	+ 1/4	+0.7
O	COGNITRONICS	1- 1	1 1/2	- 1/8	-7.6
O	COMRUTER COMMUN.	1- 2	1 1/4	- 1/4	-16.6
O	COMRUTER CONSOLES	3- 7	5 1/4	0	0.0
A	COMRUTER EQUIPMENT	1- 2	1 3/4	+ 1/4	+16.6
O	COMPUTER MACHINERY	1- 2	1 1/4	- 1/4	-16.6
O	COMRUTER TRANSCEIVER	1- 2	1 1/2	+ 1/8	+9.0
O	COMTEN	2- 5	4 7/8	- 3/8	-7.1
N	CONRAC CORR	12- 20	17 1/8	- 3/8	-2.1
O	DATA ACCESS SYSTEMS	1- 3	2	+ 3/4	+60.0
O	DATA 100	5- 16	12 3/4	- 1/8	-0.9
A	OATA PRODUCTS CORP	2- 6	5 1/4	- 3/8	-6.6
O	DATA TECHNOLOGY	1- 3	1 3/4	+ 1/8	+7.6
O	OATUM INC	1- 2	1	0	0.0
O	DECISION DATA COMPUT	4- 7	6 7/8	+ 7/8	+14.5
O	DELTA DATA SYSTEMS	1- 1	1/4	0	0.0
O	DI/AN CONTROLS	1- 1	1 1/4	0	0.0
N	ELECTRONIC M & M	1- 2	1 7/8	- 1/8	-6.2
O	FABRI-TEK	1- 1	1 1/8	- 1/4	-18.1
O	GENERAL COMPUTER SYS	1- 2	2	0	0.0
N	HAZELTINE CORP	3- 4	3 7/8	- 1/8	-3.1
N	HARRIS CORP	18- 23	22 1/2	0	0.0
A	INCOTERM CORP	3- 10	8 1/2	- 1/8	-1.4
O	INFOREX INC	2- 5	3 5/8	0	0.0
O	INFORMATION INTL INC	8- 14	12 1/2	-1 1/8	-8.2
A	LUNDY ELECTRONICS	3- 3	2 7/8	0	0.0
O	MANAGEMENT ASSIST	1- 1	5/8	0	0.0
A	MILGO ELECTRONICS	8- 20	18	- 1/8	-0.6
N	MOHAWK DATA SCI	1- 5	3 1/8	- 3/8	-10.7
O	OPTICAL SCANNING	1- 3	3	0	0.0
O	PENRIL CORP	2- 2	1 7/8	0	0.0
O	PERTEC CORP	2- 9	6	- 1/8	-2.0
A	POTTER INSTRUMENT	2- 2	1 3/4	0	0.0
O	PRECISION INST.	1- 1	1/4	+ 1/8	+100.0
O	OUANTOR CORR	2- 6	4 3/4	-1 5/8	-25.4
O	RECOGNITION EQUIP	2- 7	6 1/2	- 1/8	-1.8
N	SANOERS ASSOCIATES	3- 9	8 3/4	+ 3/8	+4.4
O	SCAN DATA	1- 3	1 5/8	- 1/4	-13.3
O	STORAGE TECHNOLOGY	6- 15	12 1/2	-1 1/8	-8.2
O	SYCOR INC	5- 14	13 1/4	- 1/4	-1.8
O	TALLY CORR.	1- 5	3 1/2	- 1/8	-3.4
O	TEC INC	1- 3	2 3/4	0	0.0
N	TEKTRONIX INC	18- 39	35 1/2	-2 1/2	-6.5
N	TELEX	1- 3	2 5/8	0	0.0
O	WANGCO INC	4- 7	5 3/4	- 1/8	-2.1
O	WILTEK INC	1- 4	3	0	0.0

SUPPLIES & ACCESSORIES

EXCH		PRICE 1975 RANGE (1)	CLOSE JUN 18 1975	WEEK NET CHNGE	WEEK PCT CHNGE
O	BALTIMORE BUS FORMS	4- 5	5	- 1/4	-4.7
A	BARRY WRIGHT	5- 7	6	+ 1/8	+2.1
O	CYBERMATICS INC	1- 1	3/4	0	0.0
A	OATA OOCUMENTS	29- 42	33 1/4	-1 5/8	-4.6
O	OUPLEX PRODUCTS INC	12- 25	19 5/8	- 3/4	-3.6
N	ENNIS BUS. FORMS	5- 7	5 7/8	- 1/8	-2.0
O	GRAHAM MAGNETICS	5- 9	7 1/4	0	0.0
O	GRAPHIC CONTROLS	8- 21	16 1/8	-1 1/8	-6.5
N	3M COMPANY	43- 68	62 7/8	- 5/8	-0.9
O	MOORE CORP LTO	39- 48	48 1/4	0	0.0
N	NASHUA CORP	15- 22	17	- 7/8	-4.8
O	REYNOLDS & REYNOLO	11- 24	14 1/2	-1	-6.4
O	STANOARO REGISTER	11- 18	17 1/4	- 1/4	-1.4
O	TAB PRODUCTS CO	4- 8	6 1/2	0	0.0
N	UARCO	17- 24	22 1/2	- 1/2	-2.1
O	VANIER GRARHICS CORP	4- 7	5 1/4	- 1/4	-4.5
A	WABASH MAGNETICS	3- 5	4 1/8	- 1/8	-2.9
N	WALLACE BUS FORMS	15- 25	22 3/4	-1	-4.2

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